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Scientific and Technical Aerospace Reports

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01 AERODYNAMICS

Includes aerodynamics of bodies, combinations, internal flow in ducts and turbo machinery; wings, rotors, and control surfaces. For applications see: 02 Aircraft and 31 Space Vehicles. For related information see also: 12 Fluid Mechanics; and 33 Thermodynamics and Combustion.

N65-28057 Joint Publications Research Service, Washington, D. C.

HYPERSONIC HELIUM FLOW ABOUT HIGHLY BLUNTED BODIES

V. N. Gusev and S. G. Kryukova *In its* Eng. J. 29 Jun. 1965 p 56–61 refs (See N65-28050 17-23) CFSTI: $6.00

Experimental studies of the nature of hypersonic helium flow are reported. In investigating the effect of the form of the blunt body on the magnitude of its drag and on the shape of the bow shock wave, circular, square, rectangular, and triangular blocks were subjected to hypersonic gas flow, and it was found that these parameters do not depend on the shape of the experimental object. A study of more highly blunted bodies—triangular pyramids, tetrahedral pyramids, and truncated cones—confirmed this conclusion about the drag coefficient. J.M.D.

N65-28059 Joint Publications Research Service, Washington, D. C.

EXPERIMENTAL STUDY OF HYPERSONIC HELIUM FLOW PAST BLUNT BODIES

V. M. Krasovskiy *In its* Eng. J. 29 Jun. 1965 p 71–77 refs (See N65-28050 17-23) CFSTI: $6.00

Hypersonic flow of helium about blunt bodies was studied experimentally to investigate the validity of the hypersonic area rule. This rule states that the forces acting upon the body, and the form of the shock wave, depend only on the variation in cross section area in the direction of hypersonic flow. The experimental blunt bodies were of simple shape, equivalent to a circular cone with semivertex angle of 5°: triangular and square pyramids and a body of more complex configuration composed of cones. The tests verified the hypersonic area rule for this class of blunt bodies. It was also found that the drag coefficient of the blunt cones does not exceed that of the pointed cone in certain cases, and that blunting of the nose of a cone leads to a considerable reduction of the lift coefficient for small angles of attack. J.M.D.

N65-28071 Joint Publications Research Service, Washington, D. C.

AN APPLICATION OF THE GENERALIZED BIOT–SAVART LAW

Ye. S. Vozhdayev *In its* Eng. J. 29 Jun. 1965 p 208–213 refs (See N65-28050 17-23) CFSTI: $6.00

Equations which describe the stationary field of induced velocities in a subsonic compressible flow about a helicopter rotor are presented. Calculations of velocities induced by bound vortices produced negligibly small quantities. Results of calculating induced velocities from free vortices revealed a small effect due to compressibility, suggesting that in first-order approximations of velocities the compressibility of air can be ignored. Higher order approximations, however, require that compressibility be taken into account, particularly since the equations defining the velocity field in the compressible and incompressible streams differ only slightly in complexity. J.M.D.

N65-28202*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

THE WIND-INDUCED LOADS ON A DYNAMICALLY SCALED MODEL OF A LARGE MISSILE IN LAUNCHING POSITION

Donald A. Buell and George C. Kenyon Washington, NASA, Dec. 1959 36 p refs

(NASA-TM-X-109) CFSTI: HC $2.00/MF $0.50 CSCL 01A fied CSCL 01A (Declassified)

Wind-tunnel tests were made of a model of a large missile in launching position. Ground winds were simulated at Reynolds numbers up to 7 million based on the maximum diameter of the model, and the dynamic response of the model was determined. Measurements were made of the bending moments, accelerations, and average drag of the model with and without various modifications. In addition, dynamic air pressures on the sides of the model were measured. The results showed that wind may induce model motions which have a randomly varying amplitude and which can produce transverse loads much larger than the dragwise loads. However, certain small modifications to the model, particularly near the nose, greatly reduced the fluctuating loads. Author

N65-28447*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

TABULATED PRESSURE DATA FOR A SERIES OF CONTROLS ON A 60° DELTA WING AT MACH NUMBERS OF 1.61 AND 2.01

Douglas R. Lord and K. R. Czarnecki Washington, NACA, 30 Mar. 1956 refs
(NACA-RM-L55L05) CFSTI: HC $5.00/MF $1.00 CSCL 01A
(Declassified)

An investigation has been made at Mach numbers of 1.61 and 2.01 and Reynolds numbers from 1.7×10^6 to 7.6×10^6 to determine the pressure distributions over a 60° delta wing having 20 different control configurations. Measurements were made at angles of attack from 0° to 15° for control deflections from −30° to 30°. This report presents the complete tabulated pressure data for the range of test conditions. Author

N65-28449*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EFFECT OF FOREBODY STRAKES ON THE AERODYNAMIC CHARACTERISTICS IN PITCH AND SIDESLIP OF A HYPERSONIC AIRPLANE CONFIGURATION AT MACH NUMBERS OF 1.41, 2.01, AND 6.86
Cornelius Driver Washington, NASA, Sep. 1959 48 p refs
(NASA-TM-X-116) CFSTI: HC $2.00/MF $0.50 CSCL 01A
(Declassified)

An investigation has been made to determine the effect of forebody strakes on the aerodynamic characteristics in pitch and sideslip of a hypersonic airplane configuration. The investigation was conducted at Mach numbers 1.41, 2.01 and 6.86. Three strake configurations were investigated through an angle-of-attack range from −4° to 28° at various sideslip angles from 0° to 21°. The short, small-span strake, which had been found suitable from a directional-stability standpoint for the low-speed landing condition, had only a negligible effect on the longitudinal stability at all supersonic speeds. The presence of the strakes at Mach numbers of 1.41 and 2.01, although resulting in some increase in the level of directional stability in the higher angle-of-attack range, did not increase the angle of attack at which neutral stability occurred. The strakes provided an increase in positive dihedral effect at Mach numbers of 1.41 and 2.01. The strakes had no measurable effect on the sideslip derivatives at a Mach number of 6.86. Author

N65-28461*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INVESTIGATION OF AN UNDERSLUNG SCOOP INLET AT MACH NUMBERS TO 1.99
Maynard I. Weinstein, Donald J. Vargo, and Frank Mc Kevitt Washington, NACA, 13 Mar. 1957 40 p refs
(NACA-RM-E56L11) CFSTI: HC $2.00/MF $0.50 CSCL 01A
(Declassified)

The performance of a scoop-type inlet on the bottom of a body of revolution was studied at Mach numbers of 0.63 and 1.50 to 1.99 and at angles of attack to 10°. The investigation included a study of the effects of altering the approach surface ahead of the inlet, extending the boundary-layer splitter plate, and bleeding air at the throat and exit of the diffuser. Peak total-pressure recoveries were 0.93, 0.875, and 0.78 at zero angle of attack at Mach numbers of 1.50, 1.79, and 1.99, respectively, for the configuration having a 2.22° inward turning of the body flat ahead of the inlet. With a body flat parallel to the fuselage centerline, pressure recoveries were increased to 0.80. Bleeding air from either flush slots or ram scoops at the inlet throat increased the peak pressure recovery to about 0.83 at Mach number 1.99. Subcritical flow instabilities, found primarily at Mach number 1.99, were caused by interaction of the terminal shock with the boundary layer of either the spitter plate or the fuselage and consequent separation of the boundary layer. Author

N65-28462*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF TWIN-DUCT VARIABLE-GEOMETRY SIDE INLETS AT MACH NUMBERS OF 1.5 TO 2.0
Richard A. Yeager, Milton A. Beheim, and John L. Klann Washington, NACA, 21 Jan. 1957 31 p
(NACA-RM-E56K15) CFSTI: HC $2.00/MF $0.50 CSCL 01A
(Declassified)

The performance of a twin-duct air-intake system mounted on the sides of a 1/8-scale fuselage forebody model of a proposed aircraft was investigated at free-stream Mach numbers of 1.5 to 2.0 over a range of angles of attack and yaw. The inlets were of the double-ramp type and were tested at 0° and −5° cant with respect to the fuselage centerline. For a particular second-ramp position a slot in the second ramp inside the cowl increased the subcritical stability over that obtained without boundary-layer removal, while perforations in the second ramp just upstream of the cowl had no effect on stability. Canting the inlets from 0° to −5° improved the total-pressure recovery at positive angles of attack greater than 2° and increased subcritical stability at all the Mach numbers investigated. At Mach number 2.0 and 2° angle of attack, the −5°-cant inlet yielded a peak pressure recovery of 86 percent and a critical mass-flow ratio of 84 percent with 28 percent stability. The distortion was about 7 percent for critical and subcritical operation. Author

N65-28463*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SOME FACTORS AFFECTING THE STATIC LONGITUDINAL AND DIRECTIONAL STABILITY CHARACTERISTICS OF SUPERSONIC AIRCRAFT CONFIGURATIONS
M. Leroy Spearman Washington, NACA, 12 Jul. 1957 42 p refs
(NACA-RM-L57E24a) CFSTI: HC $2.00/MF $0.50 CSCL 01A
(Declassified)

A survey is made of the problem introduced by the increased longitudinal stability and the reduced directional stability of aircraft operating in the low supersonic speed range. The longitudinal stability increases markedly at supersonic speeds and results in high drags due to trimming and in limited control for maneuvering. The large untrimmed pitching moments can be reduced and the control requirements alleviated to some extent through the use of fuselage camber. The use of canard configurations offers some promise of reducing the drag due to trimming and increasing the controllability. The directional stability generally deteriorates rapidly at supersonic speeds because of the reduction in vertical-tail lift-curve slope coupled with the large unstable yawing moment of the fuselage. The vertical-tail contribution is shown to be affected by many factors including the wing position, the fuselage shape, and and the horizontal-tail position. The directional stability can be increased, particularly at high angles of attack, by such devices as ventral fins and forebody strakes. In addition, indications are that the directional stability might be improved through modifications to the fuselage afterbody. Author

N65-28471# National Aerospace Lab., Tokyo (Japan).
AN INVESTIGATION OF HIGH SPEED AXIAL FLOW COMPRESSOR. IV: ROTOR PERFORMANCE AT RELATIVE INLET MACH NUMBERS UP TO 1.5 OF NACA 65-SERIES COMPRESSOR BLADES MODIFIED APPROXIMATELY TO DOUBLE CIRCULAR-ARC BLADES
Koichi Oyama, Masakatsu Matsuki, Hideo Nishiwaki, Tadasuke Iwabu, and Yasuharu Katayama 1965 36 p refs In JAPANESE; ENGLISH summary
(NAL-TR-76)

A single stage axial flow compressor rotor was tested at relative inlet mach numbers up to 1.5. NACA 65-series compressor blades were used in the first design and tested. Then they were modified approximately similar to the double circular-arc by machining and tested. A comparison of the test results between these two rotors shows that: (1) Because of the reduction of the camber angle, the work done by modified blades was about 6% less than that by the original blades in all speed range. (2) At the subsonic relative inlet mach number, both rotors could gain the value of more than 90% adiabatic efficiency. (3) At the transonic relative inlet mach number, modified blades kept higher efficiency than original ones and were more adaptable. Author

N65-28496# France. Office National d'Etudes et de Recherches Aerospatiales, Chatillon-sous-Bagneux.
THE PERSPECTIVES OF ATMOSPHERIC FLIGHT IN THE SPHERE OF ORBITAL VELOCITY [LES PERSPECTIVES DU VOL ATMOSPHERIQUE DANS LE DOMAINE DES VITESSES ORBITALES]
Pierre Contensou [1964] 26 p refs In FRENCH Presented to l'Assoc. Tech. Maritime et Aeron., Paris, 11–15 May 1964
(ONERA-TP-121(1964))

This report examines in a general manner the evolutionary tendencies of sustained flight techniques. It addresses itself in particular to the task of describing, in a schematic manner, the properties of hypersonic flight which appear to constitute the principal forseeable achievements of this evolution. The interest to associate a Keplerian orbit with soaring flight in order to achieve great distances from earth is discussed, and the role of sustained flight in the problem of earth reentry from space missions is summarily examined. This study is based on the dynamics of flight and the thermodynamic problems of high velocity flight are not discussed. Trans. by J.G.

N65-28506# France. Office National d'Etudes et de Recherches Aérospatiales, Chatillon-sous-Bagneux.
EXPERIMENTAL AND THEORETICAL RESULTS ON HEAT TRANSFER AT THE ANGLE OF ATTACK OF SWEPT WINGS IN HYPERSONIC FLIGHT [RESULTATS EXPERIMENTAUX ET THEORIQUES SUR LE TRANSFERT DE CHALEUR AU BORD D'ATTAQUE DES AILES A FORTE FLECHE EN HYPERSONIQUE]
Jacques Valensi, Roger Michel, and Daniel Guffroy [1965] 21 p refs In FRENCH Presented at the Meeting of the Fluid Mech. Group, AGARD, Naples, 10–14 May 1965
(ONERA-TP-217(1965))

An experimental and theoretical study of cooling and heat transfer at the leading edge of hypersonic wings at Mach numbers 4, 7, and 10 and at different angles of attack has led to the following conclusions: An appreciable rise in Mach number and pressure is observable at high speed along the leading edge of a real wing in a region influenced by the interaction of the forebody and the leading edge. At this rise there is a detectable variation in the heat transfer to the surface. In order to predict the heat transfer to the surface it is necessary to account for the influence of pressure gradients in the development of the three dimensional boundary layer. Application of the principle of prevalence permits a method of calculation which for large angles leads to results in agreement with experiment. The experiments made at high Mach number show an influence of entropy gradient due to the curve of the shock wave which causes a variation in the stagnation pressure at the front of the boundary layer. Author trans. by E.W.

N65-28515# Nord-Aviation, Paris (France).
CALCULATIONS OF UNDUCTED PROPELLERS. NOTICE OF USE OF PROGRAMS FOR THE IBM COMPUTER 650 [CALCU D'HELICES LIBRES DU CARENEES. NOTICE D'UTILISATION DES PROGRAMMES POUR ORDINATEUR IBM 650]
Dec. 1964 255 p In FRENCH
(RAA/R/64)

The method put into operation in this report allows for the reasonable solution in one operation of the following problems. The operation of free propellers first poses the problem of determining the field of speed induced by these propellers. This turbulent field is composed of fields created by the individual blades and the field created by the propeller as a whole. The first problem then is to express rationally the speeds induced by each turbulent component, and to be able to solve the double integration in space which allows for the determination of the right angle components of the field of each blade. The second problem is to define propeller parameters, mode of rotation, number of blades, applied power etc and from the result of the solution of the sum of the effects of these parameters to solve the problem of maximum traction. A computer program has been prepared for the ensemble of these problems. Trans. by J. G.

N65-28546# Aeronautical Research Council (Gt. Brit.)
MEASUREMENTS OF THE DIRECT PITCHING OSCILLATION DERIVATIVES FOR THREE CROPPED DELTA AND THREE ARROWHEAD PLANFORMS AT SUBSONIC AND TRANSONIC SPEEDS
C. J. W. Miles and K. B. Bridgman 1965 29 p refs Supersedes NPL-AERO-1033; ARC-23990 HMSO: 12s

Measurements of the direct pitching oscillation derivative coefficients on three cropped delta and three arrowhead planforms have been made at subsonic and transonic speeds in the N.P.L. 9 1/2 in. High-Speed Tunnel. The cropped delta wings had aspect ratios of 3·0, 2·0 and 1·5, whilst the arrowheads, of constant aspect ratio 2·575, possessed varying degrees of leading- and trailing-edge sweepback. The measurements were made about two model axes for each planform and the effects of changing amplitude of oscillation from 2° to 1° have been investigated in the transonic region. Comparison with subsonic theory is reasonably good for the damping and stiffness derivative coefficients measured about the forward axis but agreement for the latter coefficients is poorer for all the rearward axis positions. Author

N65-28594# Ohio Univ., Athens. Avionics Research Group.
EARTH COVER AND CONTOUR EFFECTS ON IMAGE GLIDE PATHS Final Report
Richard H. Mc Farland, David Hill, and Donald Luttermoser 21 May 1965 99 p refs
(Contract FA-64-WA-5060)
(EER 5-1; FAA-RD65-30)

Mathematical models of the Null-Reference and Capture-Effect glide paths in the presence of snow covered and irregular ground planes are presented. From these equations variations in glide-path position are determined for specific ground contours and covers. Greater Pittsburgh Airport site is considered as an example for which equations are solved using a 7090 computer. The results show that certain portions of the glide path are quite rough, and this agrees with previous flight measurements. Author

N65-28627*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CHARTS FOR EQUILIBRIUM AND FROZEN FLOWS ACROSS PLANE SHOCK WAVES IN CARBON DIOXIDE

Craig D. Simcox and Victor L. Peterson Washington, NASA, 1965 128 p refs
(NASA-SP-3018) CFSTI: MF $1.00 CSCL 01A

The properties across a number of types of shock waves common in engineering applications have been calculated. The shocks include the normal and oblique waves used for estimating aerodynamic performance of bodies in flight and the incident, standing, and reflected normal shock waves used for evaluating facility performance and for interpreting the results of experiments performed therein. In the present work, the flow was assumed to be in equilibrium and the chemistry to be frozen with molecular vibrations either not excited or fully excited. Results are presented in graphical form for ambient pressures ranging from 10^{-7} to 10 atmospheres and for speeds ranging from 1 to 16 km/sec. Author

N65-28634*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EXPERIMENTAL STUDY OF WIND-TUNNEL WALL EFFECTS AND WALL CORRECTIONS FOR A GENERAL-RESEARCH V/STOL TILT-WING MODEL WITH FLAP
Kalman J. Grunwald Washington, NASA, Jul. 1965 115 p refs
(NASA-TN-D-2887) CFSTI: HC $4.00/MF $0.75 CSCL 01A

The wall-effects investigation conducted in the Langley 300-MPH 7- by 10-foot tunnel, the 17-foot test section in this 7- by 10-foot tunnel, and the Langley full-scale tunnel (30- by 60-foot tunnel) on a tilt-wing configuration (with neither fuselage nor tail) showed small wall effects on the force data. The application of a wall correction theory (which accounts for wake deflection) to the force data from the 7- by 10-foot tunnel resulted in large corrections to angle of attack and dynamic pressure. This compensating effect appears to be unique for the configuration used in this investigation. Wall effects on pitching moment (flaps on) were large, particularly for data taken in the 7- by 10-foot tunnel. Author

N65-28636*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EFFECT OF NOSE BLUNTNESS AND CONTROLLED ROUGHNESS ON THE FLOW ON TWO HYPERSONIC INLET CENTER BODIES WITHOUT COWLING AT MACH 5.98
James M. Cubbage Washington, NASA, Jul. 1965 64 p
(NASA-TN-D-2900) CFSTI: HC $3.00/MF $0.75 CSCL 01A

Results from an experimental investigation of nose bluntness and controlled roughness effects on the pressure recovery, on the location of transition, and on boundary-layer development on two center bodies for an all-external-compression hypersonic inlet are presented. The models were bodies of revolution having a conical forepart followed by an isentropic compression surface. The data show that nose blunting and roughness size had only a small effect on model surface pressures. Increasing the nose radius from 0 to 0.14 inch increased the transition Reynolds number substantially. Further increases in nose radius had little or no effect on this parameter. The roughness size necessary to fix transition at the roughness location on the forebody having a 10° semiapex angle was found to exceed the boundary-layer thickness at this location by a factor of about 2. Boundary-layer momentum and displacement thickness generally increased with increasing nose radius. Author

N65-28638*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EFFECTS OF ASPECT RATIO AND CANOPY SHAPE ON LOW-SPEED AERODYNAMIC CHARACTERISTICS OF 50.0° SWEPT PARAWINGS
Frank M. Bugg Washington, NASA, Jul. 1965 44 p refs
(NASA-TN-D-2922) CFSTI: HC $2.00/MF $0.50 CSCL 01A

An investigation was made to study the effects of aspect ratio and canopy shape on the static longitudinal and lateral aerodynamic characteristics of parawings having 50.0° swept-back leading edges. Parawings with conical canopies and aspect ratios of 3.00, 4.00, 5.00, and 5.45 and parawings with cylindrical (zero twist and camber) canopies and aspect ratios of 3.00, 4.00, and 5.45 were used in the investigation. Effects of canopy fullness were investigated for aspect-ratio-5.45 parawings with both conical and cylindrical canopies. Parawings with conical canopies had extrapolated pitching-moment coefficients at zero lift that were negative at low aspect ratio and became less negative as the aspect ratio increased until at an aspect ratio of 5.45 a positive value was indicated. For the cylindrical-canopy parawings, the pitching-moment coefficient at zero lift was negative and became more negative with increasing aspect ratio for all configurations investigated. Author

N65-28710# Lockheed Missiles and Space Co., Sunnyvale, Calif.
INVESTIGATION OF THE BASE PRESSURE BEHIND AXI-SYMMETRIC BLUNT, LOW-ASPECT RATIO BODIES IN SUPERSONIC FLOW
Iu. A. Panov and G. E. Khudiakov [1965] 5 p refs Transl. into ENGLISH from Vestn. Mosk. Univ., Ser. I: Mat. i Mekhan. (Moscow), no. 3, 1965 p 83–87

Methods of computing the base drag of a body around which a supersonic stream flows were experimentally investigated. Data were obtained on the base pressure for blunt, low-aspect-ratio bodies, and the connection between the base pressure and the stream parameters ahead of the base section was studied. Wind tunnel tests were conducted on models having a main cylindrical section and replaceable heads with different rounding off. Graphical results are given for: dependence of Mach number ahead of the base section on free stream Mach number for a model with spherical nose section; the influence of rounding off the leading edge of a blunt body on the base pressure coefficient; dependence of base pressure coefficient on free stream Mach number; and dependence of reduced base pressure coefficient on Mach number ahead of the base section. M.R.W.

N65-28724# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROBLEM OF DETERMINATION DELIVERY COEFFICIENTS AND ANGLES OF OUTFLOW FROM BLADED DEVICES OF AXIAL GAS TURBINES
G. V. Proskuryakov 5 May 1965 14 p refs Transl. into ENGLISH from Teploenerg. (Moscow), no. 9, 1964 p 16–19
(FTD-TT-65-430/1+2; AD-615533)

Utilization of results of air blasting grills in static conditions when planning blading of gas turbines may lead sometimes to large errors in the aspect of determining flow out angles and, in consequence, power and efficiency of GTU. Delivery coefficients and angles of outflow from turbine grills should be determined by results of testing model stages in rotation or by calculation. Use of methods for the calculation of potential flow around profiles with an incompressible fluid, considerably facilities the problem of planning blading. Determination of velocity curve of an incompressible flow on a profile and outflow angles with consideration of compressibility and viscosity should precede any experimental investigation of grill. Industrial tests confirmed the advisability of employing calculation methods in determining delivery characteristics of blading when planning gas turbines. Author

N65-28804*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

EFFECTS OF WING DIHEDRAL AND PLANFORM ON STABILITY CHARACTERISTICS OF A RESEARCH MODEL AT MACH NUMBERS FROM 1.80 TO 4.63

Maurice O. Feryn and James F. Campbell Washington, NASA, Jul. 1965 60 p refs

(NASA-TN-D-2914) CFSTI: HC $3.00/MF $0.50 CSCL 01A

An investigation has been made to determine the effects of wing geometric dihedral and planform on the stability characteristics of a wing-body-tail research model. Geometric dihedral angles were set at 3°, 0°, and −3° for the 31° and 73° swept-leading-edge wings investigated. Tests were performed at angles of attack from about −4° to 24°, at angles of sideslip from about −4° to 8°, at Mach numbers from 1.80 to 4.63, and at a Reynolds number per foot of 3.0×10^6. The directional stability was increased by positive geometric dihedral and decreased by negative geometric dihedral for both the tail-on and tail-off configurations, particularly at the high angles of attack and high Mach numbers as a result of dynamic-pressure effects induced on the fuselage afterbody. Positive effective dihedral was increased by positive geometric dihedral and decreased by negative geometric dihedral. The highly swept wing with subsonic leading edges provided larger negative values of effective dihedral than did the wing with lower sweep and supersonic leading edges. The amount of geometric dihedral used in these tests had little or no effect on the aerodynamic characteristics in pitch. Author

N65-28839# Melpar, Inc., Falls Church, Va.

SIMULATION OF HELICOPTER AND V/STOL AIRCRAFT. VOLUME V: SUMMARY OF FINAL RESULTS Final Report, Sep. 1963–Dec. 1964

Ruth L. Faith Port Washington, N. Y., Naval Training Device Center, Dec. 1964 15 p refs

(Contract N61339-1205)

(NAVTRADEVCEN-1205-5; AD-615452)

This report is a summary of the results, conclusions, and recommendations which were derived from a study program designed to develop the equations of motion of helicopters and V/STOL aircraft in a form suitable for simulation using either an analog or a digital computer. The results of the study are: axis systems required for V/STOL and helicopter simulation; equations of motion for V/STOL aircraft and helicopter simulation; Modified Blade Element Approach to rotor simulation; second rotor simulation; tail rotor simulation; V/STOL simulation equations; optimum analog mechanizations; and digital simulation techniques. Author

N65-29005# Lockheed Missiles and Space Co., Sunnyvale, Calif.

ON INERTIAL SYSTEMS WITHOUT STABILIZERS

Dan-Chi Van [1965] 7 p refs Transl. into ENGLISH from Vestn. Mosk. Univ., Ser. I: Mat. i Mekhan. (Moscow), no. 3, 1965 p 77–82

A mathematically rigorous foundation of the principles of constructing inertial systems without stabilizers based on six accelerometers is presented. Also, a variational formulation of the problem associated with these systems is analyzed. The systems of equations obtained may take on any values without changing the structure of the equations. Hence, the results are sufficiently general, and valid in principle, for any accelerometers. In formulating the equations of motion only the general dynamics of the system were of interest and account was not taken of such inevitable additional factors as errors in the operation of the measurement instruments or the effect of the gravitational forces of many celestial bodies. These factors do not change the structure of the equations. E.E.B.

N65-29079# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EXPERIMENTAL INVESTIGATION OF INTERACTION OF COMPRESSION SHOCKS AND THE BOUNDARY LAYER IN THE RANGE OF MACH NUMBERS BETWEEN = 1.0 AND 1.8

G. L. Grodzovskiy 15 Mar. 1965 23 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Otd. Tekhn. Nauk: Energ. i Avtom. (Moscow), no. 4, 1961 p 20–31

(FTD-MT-64-258; AD-614629)

A calculated evaluation of the interaction of compression shock and turbulent boundary layer on flat plate separation parameters is given. A relationship for the point of separation in turbulent flow directly next to the wall is obtained, and equations show that, in flows with compression shocks, the separation of turbulent boundary layer on flat plate is practically independent of the Reynolds number. Data on the differential static pressure in the shocks in the 1.0 to 1.8 Mach number range were determined by investigating the interaction of compression shocks and boundary layer in a nozzle with an off-design pressure differential. The outflow from a supersonic nozzle, and supersonic flow around an airfoil and in the oblique section of airfoil cascades were also calculated. C.T.C.

N65-29084# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE THEORY OF DISRUPTED FLUTTER OF A TURBO BLADE

V. A. Uspenskiy 5 Apr. 1965 10 p refs Transl. into ENGLISH from Izv. Vyssh. Uchebn. Zaved., Energ. (Minsk), no. 2, 1964 p 68–73

(FTD-TT-64-1070/1+2; AD-615429)

A theoretical solution is proposed for the problem of finding aerodynamic pressure forces acting against a unit of length of turbo-blade span, oscillating harmoniously. The solution results can be used to determine the critical rate of disruptive flutter and to determine deformations of blades with subsequent finding of stresses in the sections along the length of the blade. TAB

02 AIRCRAFT

Includes fixed-wing airplanes, helicopters, gliders, balloons, ornithopters, etc; and specific types of complete aircraft (e.g., ground effect machines, STOL, and VTOL); flight tests; operating problems (e.g., sonic boom); safety and safety devices; economics; and stability and control. For basic research see: 01 Aerodynamics. For related information see also: 31 Space Vehicles; and 32 Structural Mechanics.

N65-28127# Boeing Co., Renton, Wash.

CONTRIBUTIONS TO THE DEVELOPMENT OF A POWER-SPECTRAL GUST DESIGN PROCEDURE FOR CIVIL AIRCRAFT Final Report

J. R. Fuller, L. D. Richmond, C. D. Larkins, and S. W. Russell 20 Apr. 1965 368 p refs Prepared for Lockheed-California Co.

(Contract FA-WA-4768)

(D6-2575, Vol. I; Rept.-18784)

The application of power-spectral techniques to assess the strength capability of airplanes subjected to continuous turbulence is considered in detail in the development of a gust design

procedure for civil aircraft. Analyses of Boeing 720B aircraft flight profiles, aerodynamics, and statistical data, as well as parametric variations and other results, are presented in tabular and graphic form. Although power spectral techniques are considered the most rational approach to airplane design, two general problems are mentioned. The first, dealing with the chain of calculations required for solutions, was partially overcome by linking the individual digital computer programs into a chain program. The second, interpreting statistical data in a meaningful way to design engineers, can be handled by the data presented in the study. It was concluded that power spectral gust analyses should be conducted early in the design stages and should include parametric variations of sensitive parameters which need better definition. One parameter versus joint probability approaches are considered, equations of motion are presented and statistical analyses for combined random stresses are made. Numerical results for wing, body, and vertical tail loads are tabulated. M.W.R.

N65-28694# Aeronautical Research Council (Gt. Brit.)
ATMOSPHERIC TURBULENCE ENCOUNTERED BY HERMES AIRCRAFT ON ROUTES TO AFRICA AND THE FAR EAST
Judy E. Aplin London, HMSO, 1965 35 p refs Supersedes RAE-TN-STRUCT-356; ARC-26237
(ARC-CP-785; RAE-TN-STRUCT-356; ARC-26237) HMSO: 6s 6d

Counting accelerometer records were obtained of the turbulence encountered by Hermes aircraft flying mainly on routes from the U.K.–Europe and Africa. Comparison has been made of results from aircraft operated by two airlines, which represent some 427,000 and 495,000 miles respectively. Typical variations in gust frequency with gust magnitude, altitude and geographical location were found and the different methods of operating the aircraft also were seen to affect the results. Author

N65-28717# Institute of Transport Aviation, Paris (France).
LANDING DECELERATION PROBLEMS AND THE USE OF ARRESTING DEVICES [RALENTISSEMENT ET ARRET DES AERONEFS LES DISPOSITIFS D'ARRET SUR LES AEROPORTS]
1964 62 p
(Rept.-64/2-E)

The present study begins with some background considerations on deceleration problems in the approach and landing phases, and goes on in Chapter II to a descriptive presentation of various types of arrester system, followed in Chapter III by some further general considerations on the problems arising with the use and presence of such systems. Although they are intended essentially, at this stage, as emergency safeguards, somewhat more systematic recourse to arresters could be contemplated when landing conditions are particularly difficult. Author

N65-28824# France. Office National d'Etudes et de Recherches Aerospatiales, Chatillon-sous-Bagneux.
AEROELASTIC STABILITY OF AIRPLANES EQUIPPED WITH AUTOMATIC PILOT [STABILITE AEROELASTIQUE D'AVIONS EQUIPES DE PILOTE AUTOMATIQUE]
Jacques Bouttes [1965] 20 p refs In FRENCH Presented at Symp. on Vibration, l'Union Internationale de Mechanique Theorique et Appliquee, Paris, 12–15 Apr. 1965
(TP-231(1965))

A method of direct determination of the domain of stability is presented which can be applied to all aircraft equipped with an automatic pilot, providing that the device is used as an active means of stabilization. This technique can be used to calculate the proper positions for various detectors onboard the aircraft. In the mathematical analysis it is assumed that the elements of control can be represented by a system of linear equations, although the method can be extended to the nonlinear case by approximation of the first harmonic. Trans. by J.M.D.

N65-28842# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE L-29 AIRPLANE
V. Podol'nyy, S. Petrov, and L. Sokolov-Sokolenok 23 Apr. 1965 9 p Transl. into ENGLISH from Kryl'ya Rodiny (USSR), no. 9, 1964 p 24–25
(FTD-TT-64-1236/1+2; AD-615286)

Details on the aerodynamic configuration, flight characteristics, and aircraft systems are given for the L-29 aircraft. Author

N65-28855*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SEPARATION TESTS OF ROCKET-PROPELLED MODELS OF A PILOT-ESCAPE CAPSULE
James A. Hollinger Jul. 1965 53 p refs
(NASA-TN-D-2901) CFSTI: HC $3.00/MF $0.50 CSCL 01C

The separation of a jettisonable-nose pilot-escape capsule was investigated by means of rocket-model flight tests. The combination model was propelled to a supersonic Mach number at a low altitude and, while in coasting flight, the capsule was propelled away from the afterbody of the model by two small solid-fuel rocket motors. The capsules were instrumented with accelerometers which showed that the accelerations and rotations were within human tolerances in a range of scale factors most likely to include a prototype single-seat aircraft. The model positions were determined from ground-based tracking cameras and onboard recovery cameras. Five flight tests were conducted, during one of which the combination did not separate. The tests in which separation occurred showed that the separation was smooth with a properly timed sequence and that the capsule must be moved rapidly away from the afterbody to minimize disturbances caused by the afterbody flow field. The afterbody with attached capsule was boosted to supersonic test velocity by a solid-propellant booster rocket in the afterbody. The flights were launched from the NASA Wallops Station. Author

N65-28861# Advisory Group for Aeronautical Research and Development, Paris (France).
RECOMMENDATIONS FOR V/STOL HANDLING QUALITIES (WITH AN ADDENDUM CONTAINING COMMENTS ON THE RECOMMENDATIONS)
Oct. 1964 71 p
(AGARD-408-A)

This Report presents the recommendations of a Working Group sponsored by the AGARD Flight Mechanics Panel, on desirable handling qualities for military V/STOL aircraft. The recommendations, which are necessarily tentative, particularly as regards their application to large aircraft, are based in some respects on requirements for U.S. military helicopters, but considerable use has been made of the results of flight assessments of handling qualities of a number of V/STOL research aircraft. To improve their validity, they should be kept under continual review by critical, systematic comparison with the accepted handling qualtities of as many new V/STOL aircraft as possible. An Addendum now included with the Report contains comments from various sources on the Recommendations. Author

N65-29047# Army Corps of Engineers, Cincinnati, Ohio. Ohio River Div. Labs.
PERTINENT CHARACTERISTICS OF MILITARY AIRCRAFT Miscellaneous Paper No. 5-1
Jul. 1964 16 p
(AD-455255)

The pertinent characteristics of selected military aircraft which affect pavement requirements at military airfields are presented. The information is directed primarily toward the engineer responsible for the planning and design of landing, takeoff, taxying, and parking facilities. Ground run distances, aircraft weights, tire pressures, wheel spacings, and aircraft dimensions are included for bomber, fighter, and cargo aircraft. E.E.B.

N65-29053# Advisory Group for Aeronautical Research and Development, Paris (France).
STABILITY AND CONTROL FOR INSTRUMENT FLIGHT
A. G. Barnes Oct. 1964 24 p refs Presented at the All Weather Operation Meeting of the AGARD Flight Mech. Panel, Munich, 12–13 Oct. 1964
(AGARD-490)

The complex relationships between pilot opinion of handling qualities and aircraft stability and control are greatly influenced by task. Implicit with task is the manner in which relevant data is transmitted to the pilot. Present-day instrument flight systems are not designed for, and are quite unsuitable for, the control of marginally stable aircraft, so that a considerable gap exists between the levels of stability acceptable for visual and instrument flight. An attempt is made to rationalise the causes of this gap. Many modern aircraft have poor stability without artificial devices; design penalties are incurred either because fail-safe stabilising devices are required or because stability requirements *for instrument flight* dictate the basic aerodynamic configuration. Full use is never made of the pilot's inherent capability to stabilise and control an aircraft—the modern trend is to reduce the pilot's role to that of monitor. This trend could be reversed by providing display elements compatible with the requirement to use the pilot as a stabilising device. An essential feature of such displays is the elimination of lags due either to data transmission or interpretation. Author

N65-29075# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TRANSPORT AIRCRAFT Selected Articles
I. Hlavac and M. Vyletal 3 Mar. 1965 150 p Transl. into ENGLISH from Dopravni Letadla, Nakladatelstvi Dopravy a Spoju (Prague), 1963 p 15–25, 32–69, 133–171, 175–200
(FTD-TT-64-733/1+2+3+4; AD-460814)

Technical data, photographs, and descriptions of transport aircraft are presented. The aircraft described include the Avia Av, Lisunov, Ilyushin, Antonov, Tupolev, Handley Page Herald Leonides, Blackburn Universal, Handley Page Herald Dart, Viscount, Bristol Britannia, BAC III, D.H. 121 Trident, Comet, Vickers, and several model types of some of the aforementioned aircraft. An international aircraft registry identification table is also given. L.S.

03 AUXILIARY SYSTEMS

Includes fuel cells, energy conversion cells, and solar cells; auxiliary gas turbines; hydraulic, pneumatic and electrical systems; actuators; and inverters. For related information see also: 09 Electronic Equipment; 22 Nuclear Engineering; and 28 Propulsion Systems.

N65-28001*# Livingston Electronic Corp., Montgomeryville, Pa.
DEVELOPMENT OF A LOW TEMPERATURE BATTERY FOR SPACE PROBE APPLICATIONS Third Quarterly Report, 24 Dec. 1964–23 Mar. 1965
William F. Meyers [1965] 56 p ref
(Contract NAS3-6009)
(NASA-CR-54378) CFSTI: HC $3.00/MF $0.50

Cell tests were conducted over the range from room temperature to −73° C. Also, single cells were operated from −73° to +20° C. Twenty grams of sulfur as an additive to the mercuric sulfate–carbon cathode and the use of partially spent electrolyte were the stabilizing factors in providing comparatively long life liquid ammonia battery performance. Also, preliminary wet stand tests were conducted at −63° C to observe the relative effects of various treatments. Favorable results were observed with the mercuric sulfate—sulfur—carbon cathode by introducing two layers of microporous rubber separation and a very light electrical load. Some indications were obtained of wet stand capability with light load at +20° C. Chemical analyses of the spent electrolyte and gases evolved during the life of two room temperature cells implied that mercuric sulfate reacts with the electrolyte and that the nitrogen evolved from the cathode is more important than anode local action. E.E.B.

N65-28146# General Electric Co., Pleasanton, Calif. Special Purpose Nuclear Systems Operation.
RESEARCH AND DEVELOPMENT PROGRAM OF THERMIONIC CONVERSION OF HEAT TO ELECTRICITY Quarterly Letter Report, 30 Dec. 1964–29 Mar. 1965
J. E. Van Hoomissen 29 Mar. 1965 12 p refs
(Contract NObs-90496; ARPA Order 219)
(QR-3; AD-464323)

Development continued on materials for a nuclear thermionic electrical generating system. Progress is reported on uranium dioxide and oxygen diffusion studies as part of an investigation on the reaction kinetics of uranium dioxide–refractory metal; the development of insulator materials; and cesium resistant metallizing, graded cermets, metal-to-metal bonding, and cesium and vacuum life testing as part of a ceramic-to-metal seals study. R.N.A.

N65-28272 Joint Publications Research Service, Washington, D. C.
MAGNETOHYDRODYNAMIC CONVERTER
I. D. Akkerman *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 152–154 ref (See N65-28250 17-10) CFSTI: $5.00

Presented is a brief description of the design and operating principles of a new generator-type converter which may find application for measuring variable pressures, displacements, and several other non-electrical values. Author

N65-28466*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RELIABILITY CONSIDERATIONS IN THE DESIGN, ASSEMBLY, AND TESTING OF THE MARINER IV POWER SYSTEM
Kirk M. Dawson, G. Curtis Cleven, and Charles D. Fredrickson 1 Jul. 1965 20 p ref
(Contract NAS7-100)
(NASA-CR-63807; JPL-TR-32-729) CFSTI: HC $1.00/MF $0.50 CSCL 10A

The probability of success for the 1964 *Mariner IV* (Mars) and the 1962 *Mariner II* (Venus) spacecraft power systems was almost equal, even though the former had considerably more parts and had to operate 2 1/2 times longer. On *Mariner IV*, cruise science instruments were to be used during the

transit to examine interplanetary phenomena, and two additional experiments—TV photography and planet occulation—were to be performed at Mars encounter. Power for the 575-lb craft is supplied from a system consisting of solar panel, battery, energy conversion, and load switching equipment. Operation of this equipment is presented and related to overall system reliability. Criteria for sizing solar panel and battery capacities are given, as well as the present power and energy margins for the *Mariner IV* power system. Particular emphasis is placed on those items that were included in the system design to increase overall reliability. Author

N65-28478# Centre National d'Etudes Spatiales, Paris (France).
SOURCES OF POWER IN SPACE [LES SOURCES DE PUISSANCE DANS L'ESPACE] Special Report No. 3
Bernard Lespinasse [1965] 11 p refs In FRENCH
(P-700)

This report briefly outlines the main sources of electric power for space missions. These are chemical sources, such as batteries and hydrogen–oxygen systems, solar energy converters, and sources of nuclear power, ranging from SNAP to alpha particle energy converters. The description and evaluation of these systems is in terms of several common parameters, among which are reliability, weight to power ratio, longevity, and ability to function at great distances from the earth, primarily in the case of solar energy converters.
Trans. by J.G.

N65-28479# Centre National d'Etudes Spatiales, Paris (France).
CONVERSION OF LUMINOUS ENERGY INTO ELECTRICAL ENERGY: PHOTOVOLTAIC CONVERSION [CONVERSION DE L'ENERGIE LUMINEUSE EN ENERGIE ELECTRIQUE: LA CONVERSION PHOTOVOLTAIQUE]
Bernard Lespinasse [1965] 26 p refs In FRENCH
(P-701)

Photovoltaic conversion of solar energy for space missions is reviewed. General photoelectric cell and conversion systems characteristics are presented—cell circuit characteristics, energy collection parameters, absorption of photons, resistance in series for maximum utilization of p-n junctions, and various geometric arrangements. Fabrication of silicon cells for optimum diffusion is presented. Also discussed are such solar generator problems as panel orientation, battery capacitance, number of elements, orientation and aspect of satellite.
Trans. by J.G.

N65-28480# Centre National d'Etudes Spatiales, Paris (France).
THE CONVERSION OF CHEMICAL ENERGY TO ELECTRICAL ENERGY: BATTERIES AND COMBUSTION CELLS [LA CONVERSION DE L'ENERGIE CHIMIQUE EN ENERGIE ELECTRIQUE: BATTERIES ET PILES A COMBUSTIBLE]
Bernard Lespinasse [1965] 22 p refs In FRENCH
(P-702)

The overall possibilities of conversion of chemical energy into electric energy are reviewed. The following rechargeable chemical battery criteria are presented: ability to withstand numerous charge–discharge cycles, possible electrolytic loss in sealed tanks, power to weight ratio, and ability to perform at extreme temperatures. At the present time it was found that only nickel–cadmium and silver–cadmium batteries satisfy the above mentioned criteria. Gas–ion exchange membrane batteries operating at cryogenic temperatures and Bacon combustion batteries are also discussed. It was found that combustion-type batteries are as suitable as solar energy converters for missions that last less than a month. Trans. by J.G.

N65-28481# Centre National d'Etudes Spatiales, Paris (France).
THE CONVERSION OF THERMIC ENERGY INTO ELECTRICAL ENERGY. PART I: THERMODYNAMIC CONVERSION [LA CONVERSION DE L'ENERGIE THERMIQUE EN ENERGIE ELECTRIQUE. 1ere PARTIE: LA CONVERSION THERMODYNAMIQUE]
Bernard Lespinasse [1965] 14 p refs In FRENCH
(P-811)

A discussion of various means of converting heat into electric energy is presented. In a brief discussion of thermodynamic cycles it is shown that a Rankine cycle most closely approaches a Carnot cycle. SNAP 2 and SNAP 8 are discussed in light of a general analysis of converters using Rankine cycles; this includes discussion of working fluids, corrosion, turbines, radiators, and the problem of the absence of gravity in space missions. Also included in this discussion is a presentation of Brayton cycle energy converters. It is concluded that the prospect of successful thermionic converters is not favorable.
Trans. by J.G.

N65-28482# Centre National d'Etudes Spatiales, Paris (France).
THE CONVERSION OF THERMIC ENERGY INTO ELECTRICAL ENERGY. PART 2: CONVERSION [LA CONVERSION DE L'ENERGIE THERMIQUE EN ENERGIE ELECTRIQUE. 2eme PARTIE: LA CONVERSION THERMOIONIQUE]
Bernard Lespinasse [1965] 14 p refs In FRENCH (P-824)
(P-824)

This report presents a state-of-the-art review of thermionic conversion of heat to electric power. Such thermionic parameters as attraction potential, current tension, current yield, maximum voltage, and space charge disturbances are defined. Also discussed is the use of interelectrode cesium vapors to neutralize the space charge which raises the threshold potential between the diodes. The use of nuclear reactors for thermionic conversion in which the reactor core acts as emitter and the reactor as collector is described. The possibility of using thermionic converters for space missions is reviewed although no forseeable systems developments are foreseen; this is due to high temperature problems and limitations of refractory materials. Trans. by J.G.

N65-28483# Centre National d'Etudes Spatiales, Paris (France).
THE CONVERSION OF THERMIC ENERGY INTO ELECTRICAL ENERGY. PART 3: THERMOELECTRIC CONVERSION [LA CONVERSION DE L'ENERGIE THERMIQUE EN ENERGIE ELECTRIQUE. 3eme PARTIE: LA CONVERSION THERMOELECTRIQUE
Bernard Lespinasse [1965] 29 p refs In FRENCH
(P-825)

This report presents a general review of principles and developmental techniques in thermoelectric conversion. The following thermoelectric principles and effects are discussed: Seebeck force, Peltier effect, Thomson effect, Kelvin relation, geometry of thermocouple, yield of thermoelectric generator, and procedures for optimal weight/yield ratio. Favorable materials for thermoelectric devices are also discussed. A discussion of space mission applications is given; a theoretical discussion of construction of thermoelectric device, isolation of junction, thermal isolation, life expectancy, radiation effects, and cost/yield ratio is presented. Various thermoelectric systems such as SNAP 3, SNAP 9, and SNAP 10A are also analyzed. It is concluded that thermoelectric conversion is feasible for space missions with low wattage requirements. Trans. by J.G.

N65-28548# Thermo Electron Engineering Corp., Waltham, Mass.
THERMIONIC EMITTER MATERIALS RESEARCH PROGRAM Final Technical Summary Report, 1 Oct. 1963–30 Nov. 1964
S. S. Kitrilakis, J. H. Weinstein, and B. Gunther [1964] 93 p refs
(Contract Nonr-3563(00))
(TE-74-65)

Progress on a materials research program for a thermionic emitter is reported. The development of an advanced test vehicle using a collector guard ring and other improvements is described. Collector work function data obtained with a niobium collector and a rhenium collector are described and analyzed. The results are compared with earlier results of molybdenum collectors. Power output data using each of the collector materials were taken and analyzed. A comparison was made between power output from similar emitters opposite rhenium, niobium, and molybdenum collectors. It was concluded that no significant difference in optimum converter performance resulted from the difference in collector material. The relationship between collector work function and converter performance is shown to be more complex than previously predicted. Earlier work on electron cooling and interelectrode radiation values is confirmed using the guarded collector test vehicle. R.N.A.

N65-28626*# Monsanto Research Corp., Everett, Mass. Boston Lab.
STUDY OF FUEL CELLS USING STORABLE ROCKET PROPELLANTS Quarterly Report No. 1, 18 Feb.–17 May 1965
R. F. Drake, L. F. Athearn, R. E. Chute, B. M. Fabuss, J. C. Orth, P. L. Terry, and J. O. Smith 28 May 1965 102 p refs
(Contract NAS3-6476)
(NASA-CR-54428; MRB-5009Q1) CFSTI: HC $4.00/MF $0.75 CSCL 10A

The design and construction of equipment to perform studies on the decomposition of N_2O_4 to an oxygen-rich fuel cell feed stream and the decomposition or steam reforming of Aerozine-50 to a hydrogen-rich fuel cell feed stream were completed. Initial studies indicated that the N_2H_4 fraction of Aerozine-50 can be decomposed at 80° C with either a Rh or Ni catalyst, but there was little decomposition of unsymmetrical dimethyl hydrazine. At 500° C a significant amount of thermal decomposition of UDMH was realized. Steam reforming of UDMH was accomplished with a Ni-base reforming catalyst at 500° C with an available H_2 efficiency of 37.4%. There was little decomposition of N_2O_4 on 6 different catalysts with temperatures up to 800° C. The decomposition of NO demonstrated on some of these catalysts indicated an inhibiting effect in the N_2O_4 decomposition either by N_2O_4 or by the product O_2. Design studies on 1/3 ft^2 electrodes for the direct use of N_2O_4 showed the importance of gas velocity and manifold grooving configuration on electrode performance. E.E.B.

N65-28866*# Yardney Electric Corp., New York.
DEVELOPMENT OF A 12 AMPERE-HOUR SEALED SILVER ZINC CELL FOR SATELLITE APPLICATIONS
J. R. Serenyi Oct. 1964 53 p ref *Its* Rept.-472-64
(Contract NAS5-3351)
(NASA-CR-63880) CFSTI: HC $3.00/MF $0.50 CSCL 10C

Cells incorporating the latest parameters of the sealed silver–zinc system were designed and cycle tested. Early designs failed after 50 cycles. A poor charge acceptance at high current density was due to electrolyte starvation in the positive compartment. To facilitate the electrolyte diffusion to the positive plates, low concentration KOH was used. It extended the cycling life of the cells but accelerated the attack on the separators. Several positive interseparators capable of retaining large amounts of electrolyte were tried but all were too thick. A separator consisting of highly calendered, non-woven polymide fibers, with good electrolyte retention and a reasonable thickness was tested and gave the cells a high cycling efficiency. R.N.A.

N65-28871*# Naval Ammunition Depot, Crane, Ind.
[SPACE CELL TEST PROGRAM] Monthly Progress Report, 31 May 1965
[1965] 125 p
(NASA-CR-63867) CFSTI: HC $4.00/MF $1.00 CSCL 10C

The results of life cycle tests on 5 and 10 cell packs of nickel–cadmium cells, 5 cell packs of silver–cadmium cells, and 10 cell packs of silver–zinc cells are presented. Data are tabulated on failure analysis results, capacity tests, and end of discharge and end of charge voltage readings for each cell on each cycle. R.N.A.

N65-28942*# Electro-Optical Systems, Inc., Pasadena, Calif.
HYDROGEN–OXYGEN ELECTROLYTIC REGENERATIVE FUEL CELLS Quarterly Report, 1 Apr.–30 Jun. 1965
M. Klein and E. Findl 18 Jul. 1965 39 p ref
(Contract NAS3-2781)
(NASA-CR-54461; EOS-4100-QL-4) CFSTI: HC $2.00/MF $0.50 CSCL 10A

Progress on the development of an electrolytically regenerative hydrogen–oxygen fuel cell is reported. The design for the first prototype 500 watt multicell unit was completed. All components were fabricated and a check out model was assembled. Due to gas leakage in the insulating spacers of the cell stack, the unit was not electrically tested. A six cell 75 watt unit was continuously cycled for 353 cycles at approximately 90° C and then discontinued because of performance degradation. Single cell tests were continued to obtain additional information on electrode structures, electrolyte-asbestos combinations, and test conditions. The major cause of cell performance degradation was found to be the oxidation of nickel in the cathode plaques. R.N.A.

N65-28950*# Westinghouse Electric Corp., Lima, Ohio. Aerospace Electrical Div.
AN EXPERIMENTAL MODEL OF A 2KW, 2500 VOLT POWER CONVERTER FOR ION THRUSTORS USING GATE CONTROLLED SWITHCES IN TWO PHASE-SHIFTED PARALLEL INVERTERS Summary Report
F. A. Elder and L. E. Staley 17 May 1965 124 p
(Contract NAS3-5917)
(NASA-CR-54216) CFSTI: HC $4.00/MF $1.00 CSCL 10B

The development of an ion thrustor power supply utilizing gate controlled switches (GCS) is described. A GCS inverter is used to convert 160 V.D.C. to 2500 V.D.C. Output voltage regulation is accomplished by varying the phase angle between two inverter stages. Overall efficiency at the rated output of 2 KW is 82.6%. Control circuits are incorporated in the system to prevent failure due to overloads and to provide automatic recycling. The total weight of the system components is 44.5 pounds. Recommendations for achieving a system weight of 24 pounds and an efficiency approaching 90% are made. The results of this program show that the GCS is a useful switching device for power conversion applications. Author

N65-29135*# Electric Storage Battery Co., Raleigh, N. C. Missile Battery Div.
RESEARCH AND DEVELOPMENT ON CELLS WITH BELLOWS CONTROLLED ELECTROLYTE LEVELS Progress Report No. 3, Dec. 10, 1964–May 10, 1965
A. M. Chreitzberg and F. S. Cushing [1965] 71 p refs
(Contract NAS5-3813)
(NASA-CR-63903) CFSTI: HC $3.00/MF $0.75 CSCL 10C

Electrolyte level control has been obtained in sealed 6 AH nickel cadmium cells with both metal and plastic bellows during 24 hour orbit cycling. Electrolyte level has varied from near full flood at end of discharge to 40% immersion at end of charge. An auxiliary electrode and increased amount of charged cadmium active material have improved oxygen recombination. Polypropylene film, heat sealed into small partially inflated pillows, has shown excellent bellows action in both cell tests and flexing tests. No failures occurred after flexing under 20% KOH for a total of 26,500 cycles: 7700 cycles at room temperature, 7800 cycles at 0° C and 11,000 cycles at 40° C. Selective grouping of pillow units can be used to "tailor" a bellows for sensitivity to action ranging from chiefly compression to chiefly expansion. Sealed 8 AH silver cadmium cells designed for optimum recombination and bellows action are under construction. The bellows compartment amounts to less than one-fourth of cell height. Charge control by a bellows-switch combination is under design for this cell.
Author

04 BIOSCIENCES

Includes aerospace medicine, exobiology, radiation effects on biological systems; protective clothing and equipment; physiological and psychological factors. For related information see also: 05 Biotechnology.

N65-28021# Columbia Univ., New York. Radiological Research Lab.
ANNUAL REPORT ON RESEARCH PROJECT
H. H. Rossi et al 1 Jan. 1965 229 p refs
(Contract AT-(30-1)-2740)
(NYO-2740-2) CFSTI: $6.00

Progress is reported in the fields of *Radiological Physics*; *Biophysics;* and *Radiobiology*. Dosimetry of monoenergetic neutrons; tissue equivalent gas multiplication chambers; dosimetry of 3 GeV protons; and dosimetry at the ORNL facility are discussed under the topic of *Radiological Physics*. Monoenergetic neutrons; computer applications; tissue equivalent spherical proportional counter; wall-less proportional counter; gamma ray spectra; quantities and functions employed in microdosimetry; relative counting rates in spheres and cylinders are also included. Radiation protection; devices for planting of active deposits; low voltage X-ray generator; self-charging phenomena; high intensity light sources; punch card translator are other problems considered. Monoenergetic neutron RBE studies; radiation effects on cells in tissue cultures; and radiation effects on bacteria and bacteria viruses are reported in the field of biophysics.
E.E.B.

N65-28023# Atomic Energy of Canada, Ltd., Ottawa (Ontario). Engineering Branch.
THE CANADIAN DESIGN APPROACH TO MEDICAL PRODUCT STERILIZATION PLANTS
M. G. Brown Jun. 1965 21 p Presented at the Conf. on Radiation Sterilization of Medical Supplies and Pharmaceuticals, Stockholm, 27 Apr. 1965
(AECL-2264) Available from Atomic Energy of Canada, Chalk River, Ontario: $0.50

The design approach to radiation sterilizing plants for medical supplies and pharmaceuticals is described. To achieve the objectives, semistandard machine components are assembled to arrive at a custom designed plant with dependability, good efficiency, and reasonable cost. Existing and planned sterilizing plants are briefly reviewed. Also discussed is the information required by the radiation plant designer, to enable him to decide the best design concept to meet the requirements of the user; and how the Atomic Energy of Canada Limited (AECL) uses the mentioned data to arrive at the best design concept. Illustrations and a discussion of some specific AECL designed and manufactured plants are included.
R.W.H.

N65-28097*# California Univ., Los Angeles. Biochemical Correlates Lab.
MOOD, MOTILITY AND 17-HYDROXYCORTICOID EXCRETION—A POLYVARIABLE CASE STUDY
Melvin Schwartz, Arnold J. Mandell, Richard Green, and Richard Ferman [1965] 19 p refs
(Grant NsG-237-62)
(NASA-CR-63785) CFSTI: HC $1.00/MF $0.50 CSCL 06E

A classic cyclic manic depressive patient was studied longitudinally over a 44 day period during one complete cycle in an attempt to correlate daily objective and subjective mood measures with objective measures of motility and to serial 24 hour urinary 17-hydroxycorticoid levels. The study added evidence in favor of the previously reported relationship between depression and increased urinary excretion of 17-hydroxycorticoid. However, this relationship may not be as specific as previously reported because the manic state is also associated with periodic elevations in corticoid excretion. This suggests that nonspecific discomfort and motility parameters warrant attention and control in such studies.
R.N.A.

N65-28101# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROBLEMS IN BIOLOGY AND BORDERLINE MEDICINE Selected Articles
15 Feb. 1965 13 p refs Transl. into ENGLISH from Vopr. Biol. Krayevoy Med., Akad. Nauk Uzbek. SSR, no. 4, 1963 p 123–130
(FTD-TT-64-636/1+2; AD-611522)

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1. PHOTOSYNTHESIS OF CHLORELLA VULGARIS BEYER AT MASS CULTIVATION IN OPEN BASINS OF UZBEKISTAN Kh. Berdykulov p 1–6 refs (See N65-28102 17-04)

2. SOME DATA ON THE CHEMICAL COMPOSITION OF CHLORELLA VULGARIS BEYER GROWN IN OPEN TANKS V. P. Kostina p 7–10 refs (See N65-28103 17-04)

N65-28102# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PHOTOSYNTHESIS OF CHLORELLA VULGARIS BEYER AT MASS CULTIVATION IN OPEN BASINS OF UZBEKISTAN
Kh. Berdykulov *In its* Probl. in Biol. and Borderline Med. 15 Feb. 1965 p 1–6 refs (See N65-28101 17-04)

Experiments were conducted with *Chlorella vulgaris* to explain the following problems: (1) diurnal process of photosynthesis of *Chl. vulgaris* suspension; (2) intensiveness of photosynthesis in dependence upon density of suspension and layer thickness; and (3) effect of carbon dioxide concentrations in blow-through air on photosynthesis. It was shown that with an increase in density and layer thickness of *Chlorella* suspension, the photosynthesis intensity decreases; at a layer thickness of *Chlorella* suspension of 5 to 15 cm the photosynthesis intensity drops from 20 to 92% in comparison with the intensity on the surface; at a depth of 20 cm no photosynthesis is revealed. The flow through of air containing carbon dioxide in *Chlorella* suspension increases the intensity of photosynthesis by three to four times. A much higher content of carbon dioxide in the flow through air does not offer noticeable activation of the photosynthesis. The diurnal photosynthesis process in *Chlorella* suspension has a single peak curve with a peak at 13 hours. N.E.A.

N65-28103# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SOME DATA ON THE CHEMICAL COMPOSITION OF CHLORELLA VULGARIS BEYER GROWN IN OPEN TANKS

V. P. Kostina *In its* Probl. in Biol. and Borderline Med. 15 Feb. 1965 p 7–10 refs (See N65-28101 17-04)

The value of a biomass of *Chlorella vulgaris* is determined by its protein, fat, and vitamin content. For the experimental mass cultivation of *Chlorella*, a Myer's culture of formula 04 of the Wuhan Hydrobiologic Institute and a garden mixture supplement by ferric chloride and soil extraction were used. The chemical composition of *Chlorella vulgaris* changed when cultivating it on these cultures in open tanks and large bottles. The following indexes were determined in the biomass of *Chlorella:* total nitrogen, by Kjeldahl's method; protein nitrogen, by precipitation by Barnstein's method with subsequent determination by Kjeldahl's method; cholorphyll by Godneb's method; carotin by Tautsin's method; ascorbic acid, by titration with respect to Tilman's reaction; and fat, by the method of non fat residue. The ash and moisture were determined by the generally accepted method when analyzing plant substances. The results of the analyses are presented. N.E.A.

N65-28123# Library of Congress, Washington, D. C. Aerospace Technology Div.

INFLUENCE OF MICROWAVES ON THE FUNCTIONAL CONDITION OF THE NERVE [DEYSTVIYE MIKROVOLN NA FUNKTSIONAL'NOYE SOSTOYANIYE NERVA Surveys of Soviet-Bloc Scientific and Technical Literature

Yu. I. Kamenskiy 18 Jun. 1965 13 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 9, no. 6, 1964 p 695–700 (ATD-T-65-39; AD-465383)

The nonthermal influence of microwaves, as reflected in functional changes in the nervous and cardiovascular systems, has been observed in a number of clinical investigations and experiments with animals. Analysis of the data from these experiments and the results of specialized investigations by Presman led to the hypothesis that microwaves basically alter the functional condition of excitatory structures. This hypothesis made it desirable to study the functional state of the frog nerve during microwave irradiation. The few reports which have been published on the influence of microwaves on the frog nerve lack data on the irradiation parameters. The present paper describes the results of investigations of the functional state of the frog nerve (N. ischiadicus) including considerations of excitability thresholds, excitation conduction rates, absolute and relative refractory phases, and amplitudes of action currents during irradiation with microwaves of nonthermal intensity in pulsed and nonpulsed systems. Author

N65-28133# Joint Publications Research Service, Washington, D. C.

AUTOMATION OF THE UNIT FOR THE STUDY OF CONDITIONED REFLEX ACTIVITY IN SMALL LABORATORY ANIMALS

B. D. Bartenev and M. Ye. Kovarskiy 7 Jul. 1965 6 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), no. 8, Aug. 1964 p 57–58 (JPRS-30962; TT-65-31460) CFSTI: $1.00

An automated unit for the study of conditioned reflex in small laboratory animals is described. The automation of the unit makes it possible: (1) to regulate by remote control the work of the unit's experimental chamber and place it inside the gas chamber; (2) to eliminate certain subjective moments while conducting the investigation; (3) to keep an objective record of the time of stimulus connection, food supply, and the animal's response reaction; and (4) to lower considerably the labor consumption of the investigation, especially in conducting chronic experiments. The basic electrical diagram of the automated unit fed from ac supply system with a voltage of 127 volts for the investigation of the conditioned reflex in small laboratory animals is presented. Programming of the unit and the procedures for operating the unit are described. N.E.A.

N65-28134# Joint Publications Research Service, Washington, D. C.

ASTEROMONAS GRACILIS ARTARI AS AN OBJECT OF MASS CULTIVATION

K. A. Voskresenskiy and Ye. V. Yurina 9 Jul. 1965 16 p refs Transl. into ENGLISH from Vestn. Mosk. Univ., Ser. VI: Biol. Pochvoved. (Moscow), no. 2, Mar.–Apr. 1965 p 29–35 (JPRS-30995; TT-65-31493) CFSTI: $1.00

The conditions for the successful cultivation of the algae, *Asteromonas gracilis Artari* were investigated. It was found that good growth of this algae occurs at 20° to 25° C. At a higher temperature the speed of growth is retarded, and at 36° C the cells discolor and die on the fourth day. At temperatures below 20° C the rate of cell division slows down markedly. The viability of the algae is retained down to a temperature of 0° C; however, no cell division takes place at this temperature, but upon their return to normal conditions they quickly begin multiplying. The most favorable growth takes place in the presence of urea. Also, no seasonality was observed in the growth of the algae. The intensity of growth of the algae was found to depend to a great extent on the availability of CO_2 which was fed to the algae by a jet of air containing 5% CO_2. E.E.B.

N65-28135*# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

EFFECTS OF SIMULATED ROCKET-JET EXHAUST ON STABILITY AND CONTROL OF A RESEARCH-TYPE AIRPLANE CONFIGURATION AT A MACH NUMBER OF 6.86

David E. Fetterman, Jr. Washington, NASA, Oct. 1959 36 p refs (NASA-TM-X-127) CFSTI: HC $2.00/MF $0.50 CSCL 01A (Declassified)

An investigation has been undertaken in the Langley 11-inch hypersonic tunnel at a free-stream Mach number of 6.86 to determine the jet-interference effects at high jet-static-pressure ratios on the stability and control of a research-type airplane configuration. Compressed-air tests with a jet exhausting from the base of the fuselage were conducted. The results of these tests indicated that the operation of the jet induced a sizable separated-flow region over the vertical- and horizontal-tail surfaces which could be approximately duplicated at low angles of attack by use of metal jet-boundary

simulators. The results of force tests, during which these metal jet-boundary simulators were used, indicated that this separated-flow region caused a large reduction in the longitudinal stability and control and a smaller reduction in the lateral and directional stability and control. By extending the divergent section of the nozzle and thus reducing the jet-static-pressure ratio, these losses were diminished. Author

N65-28140# Joint Publications Research Service, Washington, D. C.
ELIMINATION OF HYPOTHERMIA IN DOGS BY MEANS OF HIGH FREQUENCY CURRENTS
N. V. Semenov 9 Jul. 1965 5 p refs Transl. into ENGLISH from Byull. Eksptl. Biol. i Med. (Moscow), no. 4, Apr. 1965 p 17–19
(JPRS-30998; TT-65-31496) CFSTI: $1.00

Investigations were conducted to examine the possibility of using high frequency currents for warming large animals in a state of hypothermia. A diathermy apparatus with an operating current near 165 kilohertz and a LUCh-58 apparatus with an operating current of 2375 ±50 were used. The methods were extremely effective and caused no burning. The short wave diathermy increased the body temperatures of dogs from range of 24.8° to 26.4° C to 30.8° to 33.6° C within 40 to 45 minutes. The LUCh-58 increased the body temperatures of dogs to a range of 32° to 32.8° C within half an hour. The dogs needed no further treatment and reached a normal body temperature unaided. R.N.A.

N65-28142# Joint Publications Research Service, Washington, D. C.
EFFECT OF OXYGEN, CARBON DIOXIDE, AND NITROGEN ON THE ELECTRIC PROPERTIES OF THE SMOOTH MUSCLE
M. F. Shuba 9 Jul. 1965 10 p refs Transl. into ENGLISH from Fiziol. Zh., Akad. Nauk Ukr. RSR (Kiev), v. 10, no. 2, Mar.–Apr. 1964 p 156–162
(JPRS-31013; TT-65-31511) CFSTI: $1.00

Experiments on the effect of oxygen, carbon dioxide, and nitrogen on physical electrotonus and action currents of the smooth annular stomach muscles of the frog indicate that the aerobic stage of metabolism plays an important role in changing the electrical properties of smooth muscles. Under the effect of oxygen, physical electrotonus is slightly decreased, spontaneous activity is increased, and the latent period of action currents is shortened. A gaseous mixture of 95% oxygen and 5% carbon dioxide decreases physical electrotonus, lengthens the latent period of the action current, and suppresses spontaneous activity. Changes in the electrical properties of muscles, particularly physical electrotonus, caused by oxygen, carbon dioxide, and nitrogen are easily reversible. Tests were made by excising a 2 × 20 mm strip from the interior portion of the stomach. The strip, with the polarizing and leadout electrodes (Ag–AgCl) attached, was placed in a dampening chamber which was hermetically sealed. M.W.R.

N65-28173# Kansas State Univ., Manhattan. Dept. of Psychology.
THE EVOLUTION OF PERCEPTUAL FRAMES OF REFERENCE
William Bevan Jan. 1965 37 p refs
(Contract Nonr-3634(01))
(TR-21; TR-22; TR-23; TR-24; AD-610438)

Several problems in physiological psychology are presented along with a discussion of the methods used and results. Included are the perception of auditory patterns as a function of incidental visual stimulation, vigilance performance with a qualitative shift in verbal reinforcers, and the potency of a lightness anchor as a function of the reflectance of its background. Also presented are the history and the intellectual trends leading to the present state of psychophysics. R.N.A.

N65-28174# Joint Publications Research Service, Washington, D. C.
EFFECT OF CORIOLIS ACCELERATION ON THE HUMAN ORGANISM
V. S. Nesterenko 2 Jul. 1965 19 p refs Transl. into ENGLISH from Usp. Sovrem. Biol. (Moscow), v. 59, no. 2, Mar.–Apr. 1965 p 246–256
(JPRS-30927; TT-65-31426) CFSTI: $1.00

The scientific literature on the effects of Coriolis acceleration on the human vestibular apparatus is reviewed. Coriolis acceleration is of particular interest in aviation medicine since it is the result of the combined motion of the pilot's head and the angular motion of his aircraft. Studies have associated it with various disturbances of the semicircular canals. Threshold magnitudes of Coriolis accleration have been studied in connection with manifestations of nystagmus, the sensation of simulated incline, banking illusions, and body deflection. Of particular interest in space research is the effect of Coriolis acceleration extended at relatively low levels over long periods of time. Considerable experimentation with animals and human subjects has been done in rotation chambers to investigate chronic effects, adaptation processes, and recovery after simulated flight. J.M.D.

N65-28194# Tracor, Inc., Austin, Tex.
[BINAURAL INTERACTION INVESTIGATIONS] Summary Report, 1 Apr. 1964–1 Apr. 1965
29 Apr. 1965 53 p refs
(Contract Nonr-4193(00))
(TRACOR-65-181-U; AD-614613)

The two experiments reported here are concerned with detectability as a function of interaural intensity differences. The experiments investigate masking in the $N_o.S_m$ and $N_u.S_m$ conditions and are concerned with a model of binaural interaction recently proposed by Jeffress. Other models are also suggested and are considered in order to account for the processes of binaural interaction. The second investigation reported here represents the first set of data collected in the newly-expanded psychophysical laboratories at TRACOR, Inc., and demonstrates the facility with which large amounts of data may be collected in a relatively short period of time. With this capability, detectability as a function of interaural intensity differences is being examined at other interaural noise correlations in the testing of models of binaural interaction.
Author

N65-28205# London Univ., England. Inst. of Laryngology and Otology.
ENERGY TRANSFORMATION WITHIN THE INNER EAR Final Technical Report
D. F. N. Harrison Jul. 1964 9 p refs
(Grant AF-EOAR-63-30)
(AFOSR-65-0040; AD-610567)

At present the main emphasis has been applied to the cochlea of the Chiroptera and Rodentia but the more difficult problem of interpreting the considerable amount of laryngeal sections is now underway. Analysis of the many tape recordings made of the sounds emitted by these mammals has enabled the workers to postulate, and in some cases, verify theories of echolocation and voice production. This work naturally stimulates thought into the more pertinent problems of human auditory perception and voice production. New apparatus and

techniques have, of necessity, had to be developed to meet the specialized nature of these investigations. A reference collection is now available of both preserved specimens and serially sectioned slides—of many species of both the bats, rodents and other mammals. Author

N65-28223# Joint Publications Research Service, Washington, D. C.
MULTIPERIODIC CHANGES IN CONCENTRATION OF VARIOUS BLOOD COMPONENTS
S. E. Shnol' and V. I. Grishina 9 Jul. 1965 12 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 9, no. 3, 1964 p 376–381
(JPRS-31007; TT-65-31505) CFSTI: $1.00

Changes in radioactivity of blood samples taken from peripheral vessels of rabbits following intravenous administration of substances labeled with radioactive isotopes are characterized by multiperiodic fluctuations. The isotopes used included P^{32}-phosphate, S^{35}-sulfate, and I^{131}-labeled human plasma proteins. Fluctuations in the amount of radioactivity in the blood were probably related to the radioactive irradiation of the isotopes used as indicators, and these fluctuations changed markedly under the influence of pharmacologically active agents, particularly medinal. For medinal the range fluctuations increase markedly, probably caused by increase in sluggishness and slowing of the regulatory system reaction time. The opposite effect is obtained with caffeine. Great similarity was observed in curves reflecting changes in radioactivity of blood (P^{32}) in different animals. M.W.R.

N65-28236# Harry Diamond Labs., Washington, D. C.
NONLINEAR DIFFERENTIAL EQUATIONS IN CIRCULATORY SYSTEM MODELLING
Walter J. Brinks 10 Feb. 1965 24 p refs
(HDL-TR-1244; AD-614702)

Nonlinear differential equations are suggested as models in the large of the circulatory system. The response of a particular second-order differential equation is examined with respect to changes in external resistance and system mass; approximate analogues are suggested between this response and that of the heart-blood network complex. Author

N65-28286# Joint Publications Research Service, Washington, D. C.
MISCELLANEOUS ARTICLES IN *PRIRODA* (NATURE, NO. 4, 1965) ON SPACE FLIGHT AND PHYSIOLOGICAL AND MEDICAL DEVELOPMENTS
3 Jul. 1965 38 p refs Transl. into ENGLISH from Priroda (Moscow), no. 4, 1965 p 9–16, 46–53, 78–81, 108–110
(JPRS-30944; TT-65-31443) CFSTI: $2.00

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2. ALONG THE ROUTE FROM THE EARTH TO THE MOON—A BIOLOGICAL EVALUATION OF DANGER FROM RADIATION DURING SPACE FLIGHTS V. V. Antipov, M. D. Nikitin, and P. P. Saksonov p 13–24 ref (See N65-28288 17-04)

3. THERMAL MOTION IN LIVING PROTOPLASM N. A. Mal'tsev p 25–30 ref (See N65-28289 17-04)

4. GENETICS AT A NEW STAGE OF DEVELOPMENT L. M. Kryukova p 31–33 (See N65-28290 17-04)

N65-28288 Joint Publications Research Service, Washington, D. C.
ALONG THE ROUTE FROM THE EARTH TO THE MOON—A BIOLOGICAL EVALUATION OF DANGER FROM RADIATION DURING SPACE FLIGHTS
V. V. Antipov, M. D. Nikitin, and P. P. Saksonov *In its* Misc. Articles in Priroda (Nature, No. 4, 1965) on Space Flight and Physiol. and Med. Develop. p 13–24 ref (See N65-28286 17-04) CFSTI: $2.00

An evaluation of the biological effects of cosmic radiation is presented, which was designed to determine the magnitude of danger to be expected during manned lunar flights. Analyzed were primary cosmic radiation (PCR), ionizing radiation of the radiation belts surrounding the earth, and radiation from solar flares. Presented are data on the composition of each type of radiation, the energy spectrum, the interaction of the charged particles with matter, and the biological dosage created by each type of radiation. It is concluded that the integral dosage of radiation from PCR and the radiation of natural and artificial belts near the earth with a shielding of 1 to 2 g/cm^2 must not exceed 10 rem for a two-week flight on a lunar trajectory. To avoid the deleterious effects of solar flare radiation, the physical shielding should be increased to 3 g/cm^2. Medicinal shielding of cosmonauts from ionizing radiation is also proposed. S.C.W.

N65-28289 Joint Publications Research Service, Washington, D. C.
THERMAL MOTION IN LIVING PROTOPLASM
N. A. Mal'tsev *In its* Misc. Articles in Priroda (Nature, No. 4, 1965) on Space Flight and Physiol. and Med. Develop. p 25–30 ref (See N65-28286 17-04) CFSTI: $2.00

A study on the role of thermal molecular motion (diffusion) in living protoplasm is reported. Cited are results of a quantitative evaluation of thermal motion in which nuclear spinal echo determinations were employed. It was found that a relatively high level of internal thermal motion occurred in living protoplasm, which supported the hypothesis that protoplasm is a liquid. Also discussed is the importance of the diffusional homostat to the adaptation of organisms to changing external environmental conditions, its role in the regulation of thermal motion with the aid of absorbent barriers, and the significance of thermal molecular mechanisms to the process of aging. S.C.W.

N65-28290 Joint Publications Research Service, Washington, D. C.
GENETICS AT A NEW STAGE OF DEVELOPMENT
L. M. Kryukova *In its* Misc. Articles in Priroda (Nature, No. 4, 1965) on Space Flight and Physiol. and Med. Develop. p 31–33 (See N65-28286 17-04) CFSTI: $2.00

A synopsis of research reported at the Moscow State University All-Union Symposium on *Experimental Mutagenesis in Animals, Plants, and Microorganisms* is presented. Among the research cited were included studies on the practical use of mutagens; conditions under which mutations occur; the evolution and genetic adaptation of organisms to radiation and radiational diseases; and studies which indicated that mutational changes are associated with molecular realignments occurring in chromosomes of a cell nucleus. S.C.W.

N65-28291# Joint Publications Research Service, Washington, D. C.
STUDIES IN PHYSIOLOGICAL EFFECTS CAUSED BY ORGANOPHOSPHORUS INSECTICIDES, CARBON MONOXIDE AND METHANE EXPOSURE, AND INHALATION OF FIBERGLASS PLASTICS FUMES

8 Jul. 1965 18 p refs Transl. into ENGLISH from Farmakol. i Toksikol. (Moscow), no. 2, 1965 p 245–250 (JPRS-30976; TT-65-31474) CFSTI: $1.00

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1. THE EFFECTS OF SOME ORGANOPHOSPHORUS INSECTICIDES THROUGH THE SKIN Yu. I. Kundiyev p 1–5 refs

2. MORPHOLOGICAL CHANGES IN THE LIVER FOLLOWING EXPOSURE OF THE ORGANISM TO CARBON MONOXIDE, METHANE, AND THEIR COMBINATIONS L. I. Morozova p 6–9 (See N65-28292 17-04)

3. PATHOLOGICAL CHANGES IN THE ANIMAL ORGANISM DURING INHALATION OF FUMES EMANATING FROM SOME SPECIMENS OF FIBERGLASS REINFORCED PLASTIC V. N. Russkikh and O. A. Naumova p 10–15 refs (See N65-28293 17-04)

N65-28292 Joint Publications Research Service, Washington, D. C.

MORPHOLOGICAL CHANGES IN THE LIVER FOLLOWING EXPOSURE OF THE ORGANISM TO CARBON MONOXIDE, METHANE, AND THEIR COMBINATIONS

L. I. Morozova *In its* Studies in Physiol. Effects caused by Organophosphorus Insecticides, Carbon Monoxide and Methane Exposure, and Inhalation of Fiberglass Plastics Fumes 8 Jul. 1965 p 6–9 (See N65-28291 17-04) CFSTI: $1.00

As part of a program on mining safety, the morphological condition of the liver under the combined influence of carbon monoxide and methane was studied. The necessity of this combination was dictated by the fact that in some areas of the mine the atmosphere of the shafts is saturated with a high content of carbon monoxide and methane. Experiments on white mice led to the following conclusions: 1) Carbon monoxide causes a pronounced disorder in blood circulation, dystrophic changes in parenchymatic elements, disruption of fatty and albumen exchanges, and total increase in size of nuclei of liver cells. 2) In the combined action on an organism of carbon monoxide and high-percent methane less pronounced changes are observed in the liver, than under the influence of carbon monoxide along. 3) High-percent methane with a normal content of oxygen in a gaseous mixture does not cause any structural or functional changes in the liver. J.L.D.

N65-28293 Joint Publications Research Service, Washington, D. C.

PATHOLOGICAL CHANGES IN THE ANIMAL ORGANISM DURING INHALATION OF FUMES EMANATING FROM SOME SPECIMENS OF FIBER GLASS REINFORCED PLASTIC

V. N. Russkikh and O. A. Naumova *In its* Studies in Physiol. Effects caused by Organophosphorus Insecticides, Carbon Monoxide and Methane Exposure, and Inhalation of Fiberglass Plastics Fumes 8 Jul. 1965 p 10–15 refs (See N65-28291 17-04) CFSTI: $1.00

Histological tests were performed on the heart, lungs, liver, spleen and nervous system to determine pathological changes resulting from the inhalation of fumes from fiber glass reinforced plastics. The most toxic plastics were found to be styrolene and hyperes, which may in certain concentrations cause extremely drastic alterations in the nervous system and the parenchymatose organs. J.L.D

N65-28294# Joint Publications Research Service, Washington, D. C.

STUDIES IN HYGIENE AND SANITATION

9 Jul. 1965 47 p refs Transl. into ENGLISH from Gigiena i Sanit. (Moscow), no. 4, Apr. 1965 p 3–6, 12–16, 28–32, 44–51 (JPRS-30993; TT-6531491) CFSTI: $2.00

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1. SUBSTANTIATING THE MAXIMUM PERMISSIBLE DAILY AVERAGE CONCENTRATION OF CARBON MONOXIDE IN THE ATMOSPHERIC AIR T. M. Shul'ga p 1–7 refs (See N65-28295 17-04)

2. PURIFICATION OF WATER CONTAMINATED WITH BOTULINUS TOXIN BY MEANS OF ION-EXCHANGE POLYMERS Ye. V. Shtannikov and V. A. Zhuravlev p 8–16 refs (See N65-28296 17-04)

3. THE EFFECT OF NOISE LEVEL ON WORKING EFFICIENCY S. D. Kovrigin and A. P. Mikheyev p 17–23 refs (See N65-28297 17-05)

4. THE IMMEDIATE PROBLEMS OF INDUSTRIAL TOXICOLOGY I. V. Sanotskiy p 24–28 refs (See N65-28298 17-04)

5. THE EFFECT OF LONG-TERM ADMINISTRATION OF SMALL DOSES OF CALCIUM-45 ON CERTAIN INDICES OF NATURAL IMMUNITY V. I. Ternov p 29–38 refs (See N65-28299 17-04)

6. REVIEW OF THE BOOK "TEKHNICHESKIYE USLOVIYA NA METODY OPREDELENIYA VREDNYKH VESHCHESTV v VOZDUKHE" [TECHNICAL SPECIFICATIONS FOR METHODS OF DETERMINING HARMFUL SUBSTANCES IN THE AIR] p 39–44

N65-28295 Joint Publications Research Service, Washington, D. C.

SUBSTANTIATING THE MAXIMUM PERMISSIBLE DAILY AVERAGE CONCENTRATION OF CARBON MONOXIDE IN THE ATMOSPHERIC AIR

T. M. Shul'ga *In its* Studies in Hyg. and Sanit. 9 Jul. 1965 p 1–7 refs (See N65-28294 17-04) CFSTI: $2.00

Two white rats were subjected to chronic CO poisoning of about one and two mg/cu m around the clock for two and a half months. It was found that CO in an average concentration of 2.65 mg/cu m under conditions of round-the-clock chronic ppisoning for a period of two and a half months caused a certain change in porphyrin metabolism. CO in average concentration of 1.3 mg/cu m under the same conditions causes no change in the motor chronaxie or porphyrin metabolism of experimental animals and has no effect on the function of the hemopoietic system. The average daily maximum permissible concentration of CO in the atmospheric air at a level of 1 mg/cu m as now adopted, may be recognized as experimentally substantiated at the current stage. N.E.A.

N65-28296 Joint Publications Research Service, Washington, D. C.

PURIFICATION OF WATER CONTAMINATED WITH BOTULINUS TOXIN BY MEANS OF ION-EXCHANGE POLYMERS

Ye. V. Shtannikov and V. A. Zhuravlev *In its* Studies in Hyg. and Sanit. 9 Jul. 1965 p 8–16 refs (See N65-28294 17-04) CFSTI: $2.00

This work presents data from experimental investigations on the use of ion-exchange polymers for the purification of water contaminated with botulinus toxin. From the experimental data, it was shown that ion-exchange polymers are effective means for purifying water not only of bacteria, but also of highly pathogenic agents—biological poisons (botulinus toxin). The toxin-inactivation mechanism is explained by the combined effect of sorption as well as by the denaturing effect of aggressive media which form as a result of ion exchange. The treatment of water with ionites according to the OH-anion + H-cation scheme, which causes the formation of an alkali filtrate, makes it possible to inactivate the toxin with particular effectiveness and speed. N.E.A.

N65-28298 Joint Publications Research Service, Washington, D. C.
THE IMMEDIATE PROBLEMS OF INDUSTRIAL TOXICOLOGY
I. V. Sanotskiy *In its* Studies in Hyg. and Sanit. 9 Jul. 1965 p 24-28 refs (See N65-28294 17-04) CFSTI: $2.00

Problems of industrial toxicology can be solved by combining the theoretical and practical trends in laboratory toxicological experiment with the hygienic evaluation of new technology employed in chemical production, as well as with the appropriate clinical research. Some of the problems considered in industrial toxicology are: maximum permissible concentrations of the new chemicals that the air may contain, and comprehensive measures of prophylaxis; efficient technology which rules out the use of highly toxic and dangerous compounds; appropriate condition of work and rest; individual means of protestion; therapeutic and prophylactic diet; and methods of early diagnosis. Methods by which the solutions of some of these problems are discussed. N.E.A.

N65-28299 Joint Publications Research Service, Washington, D. C.
THE EFFECT OF LONG-TERM ADMINISTRATION OF SMALL DOSES OF CALCIUM-45 ON CERTAIN INDICES OF NATURAL IMMUNITY
V. I. Ternov *In its* Studies in Hyg. and Sanit. 9 Jul. 1965 p 29-38 refs (See N65-28294 17-04) CFSTI: $2.00

The daily introduction of Ca-45 into white rats in a dose one thousand times in excess of the maximum permissible concentration (MPC) of this isotope for water (0.09 microcurie/kg) causes clear signs of chronic radiation injury in animals from as early as the third month on. Ca-45 in a dose one hundred times in excess MPC induces the first signs of radiation injury in ten and a half months of introducing it into the white rats. The daily introduction of Ca-45 into white rats in a dose of 0.0009 microcurie/kg (ten times excess MPC) over the space of nine months induces only negligible functional changes involving certain immunity factors. This dose of the isotope can be regarded as the threshold dose. N.E.A.

N65-28325# Rochester Univ., N. Y. Atomic Energy Project.
PLUTONIUM UPTAKE BY ANIMALS EXPOSED TO A NON-NUCLEAR DETONATION OF A PLUTONIUM-BEARING WEAPON SIMULANT. PART I: FIELD OPERATIONS
R. H. Wilson and J. L. Terry 28 Jun. 1965 49 p refs
(Contract W-7401-ENG-49)
(UR-665) CFSTI: $3.00

Operation Roller Coaster was a joint United States–United Kingdom field exercise undertaken to aid in the evaluation of criteria for the storage and transport of Plutonium-bearing weapons. The biological studies performed as a part of this Operation consisted of exposing 300 dogs, sheep and burros on a highly mobile array to the cloud generated by the chemical detonation procedures employed in the biological studies. Subsequent reports will present results, interpretations, etc. Author

N65-28341# Federal Radiation Council, Washington, D. C.
IMPLICATIONS TO MAN OF IRRADIATION BY INTERNALLY DEPOSITED STRONTIUM-89, STRONTIUM-90, AND CESIUM-137
Arthur C. Upton et al 31 Dec. 1964 38 p refs Report of an Advisory Comm. from the Div. of Med. Sci. NAS-NRC

In reviewing the possible biological effects of irradiation, particular consideration was given to hazards that might result from uptake of any of these isotopes under conditions leading to cumulative dose levels of 25 rads or less within about one year after contamination. The effects of these nuclides in man, in view of their particular metabolic properties and in relation to known irradiation results from other internally deposited radioelements and from external sources, were surveyed. Risks of chief concern from internally deposited cesium-137, strontium-89, and strontium-90 are considered to be the carcinogenic effects on the exposed embryo, fetus, child, and adult. Also considered as risks are the genetic effects, and the effects on the development of the exposed embryo and fetus due to cesium-137; and disturbances of skeletal growth and development in the exposed embryo and fetus as a result of strontium-89 and strontium-90 dosages. M.G.J.

N65-28346*# Oklahoma City Univ., Okla.
[INTERDISCIPLINARY STUDIES OF THE EFFECTS OF THE SPACE ENVIRONMENT ON BIOLOGICAL SYSTEMS]
Semiannual Status Report
30 Apr. 1965 50 p refs
(Grant NsG-300-63)
(NASA-CR-63790) CFSTI: HC $2.00/MF $0.50 CSCL 06S

The effects of the experimental environment on the turnover rates of metabolic pools after 4 and 12 weeks of exposure and evidence of the oxidative state of the tissues in another experiment for 4, 8, or 12 weeks are reported. It was found that exposure of rats for four weeks to a high oxygen–low pressure environment produced symptoms of marginal oxygen toxicity. After prolonged exposure, many of the parameters which were observed earlier to be abnormal tend to return to the levels found in the control animals, although some did not. The response of coenzyme A was as expected. In the early stages of the experiment, it was destroyed by a high cellular level of oxygen. On longer exposure, the oxygen tension at the cellular level was decreased and the coenzyme concentration was allowed to return to normal. The hematocrit values of the experimental animals decreased while hemoglobin suffered parallel decreases. Small increases in methemoglobin were observed in the blood of these animals though glucose-6-phosphate dehydrogenase activity roughly paralleled the changes in numbers of red cells. E.E.B.

N65-28350*# Naval School of Aviation Medicine, Pensacola, Fla.
COMPARATIVE EFFECTS OF PROLONGED ROTATION AT 10 RPM ON POSTURAL EQUILIBRIUM IN VESTIBULAR NORMAL AND VESTIBULAR DEFECTIVE HUMAN SUBJECTS
Alfred R. Fregly and Robert S. Kennedy 23 Mar. 1965 25 p refs Joint rept. with NASA
(NASA Order R-93)
(NASA-CR-63799; NSAM-920) CFSTI: HC $1.00/MF $0.50 CSCL 06S

As a means of better understanding the role of the vestibular organs in relation to ataxic responses to prolonged rotation, two contrasting groups of subjects were studied to: 1) determine quantitatively to what extent two visually-enhanced postural equilibrium test performances of labyrinthine defective subjects (L-D's) on a single rail of optimum difficulty become disturbed along the time axis of rotation (Experiment A), and 2) compare the performances of L-D's with normals in terms of postrotation effects as studied with a new standardized ataxia test battery (Experiment B). Rotation-induced ataxia was superimposed to an appreciable extent upon the previously present and characteristic vestibular ataxia in the L-D's (Exp. A), and (in Exp. B), upon cessation, there were significant decrements on all Test Battery performances of the normal group, whereas in the L-D group significant decrements were observed only on the two visually-enhanced tests. Other

findings, which were considered tentative, are discussed in terms of several unresolved methodological problems in such experiments. Author

N65-28352# Technology, Inc., Dayton, Ohio.
STUDIES ON VERTEBRAL INJURIES SUSTAINED DURING AIRCREW EJECTION Final Report
Lawrence S. Higgins, Stuart A. Enfield, and Robert J. Marshall May 1965 151 p refs
(Contract Nonr-4675(00))
(TI-65-041; AD-615442)

Available world literature on ejection-related vertebral injuries in aviators was thoroughly surveyed and is presented as an annotated bibliography. Basic findings of some of the principal investigators into vertebral injury are summarized. Parameters associated with the pilot, aircraft, and ejection-seat system are evaluated in the light of their trends and relative significance in contributing to ejection-caused vertebral injury. These studies led to the development of a proposed research design to determine the dynamic strength of isolated vertebrae. Preliminary research objectives are outlined. The experimental procedure and analysis techniques are set forth. A plan for sequencing and integrating the research operations is diagramed. Author

N65-28357# Joint Publications Research Service, Washington, D. C.
THE EFFECT OF MICROWAVES OF VARYING INTENSITY ON THE BLOOD AND HEMOPOIETIC ORGANS OF WHITE RATS
I. A. Kitsovskaya 18 Jul. 1965 10 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), no. 6, Jun. 1964 p 14–19
(JPRS-31047; TT-65-31545) CFSTI: $1.00

Reported are the effects of the administration of a dose of radiation with 10-centimeter wave pulses upon the blood and hemopoietic organs (bone marrow and spleen) in white rats. After establishing each rat's background level for hemoglobin content, the number of erythrocytes, reticulocytes, and leukocytes and their differential, radiation of the animals was begun with the microwave intensity and exposure periods varied for each group. Periodic blood studies were performed, and changes in the number of formed blood elements in each animal were compared and the results recorded. M.R.W.

N65-28531# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PHYSICOCHEMICAL ASPECTS OF THE CONDITIONING OF PHYTOPHARMACEUTICAL PREPARATIONS
S. Petrascu, Margareta Baltac, and Maria Ilie 31 Mar. 1965 39 p refs Transl. into ENGLISH from Rev. Chim. (Rumania), v. 15, no. 2, 1964 p 91–100
(FTD-TT-64-1121/1+2+3+4; AD-463478)

The phenomenon of wetting is considered in the use of phytopharmaceutical substances for plant protection. Also considered are the surface phenomenon; the formation and stability of the emulsions; and the granular structure of the preparations, such as powders, pastes, suspensions, emulsions, and sprays. A literature survey showed that the degree of dispersion of emulsions and suspensions influenced their biological effectiveness, and that optimal dispersion depended on the active substance and on the species of the organism to be combatted. Various methods for determining common quality norms were studied, and the numerical data obtained were compared with values indicated in the literature. As a result, some 300 preparations were examined, and criteria established for such main categories as powders for dusting, wettable powders, and emulsifiable preparations. For powders, these norms include specifications for moisture content; percentages of coarse, large, and fine granules; bulk weight; adhesion; and suspensibility. Specifications for emulsifiable preparations cover water content, density, stability of the preparation and emulsion, and wetting power. The methods of analyses are described. M.G.J.

N65-28538*# North Carolina State Coll., Raleigh. Dept. of Genetics.
UTILIZATION OF HABROBRACON AND ARTEMIA AS EXPERIMENTAL MATERIALS IN BIOASTRONAUTIC STUDIES Status Report, Jan.–Jun. 1965
D. S. Grosch [1965] 7 p
(Grant NsG-678)
(NASA-CR-63829) CFSTI: HC $1.00/MF $0.50 CSCL 06F

The combined effects of radiation and gravity forces in excess of 1-g were investigated using the wasp, Habrobracon. A motor designed for long continuous operation fitted with a head machined to hold capsules of wasps was used in this investigation. Centrifugation for a few minutes at a speed providing a force of 1000 g was found too severe for all stages of the braconid life cycle; however, the majority of adults survived 500 g for as long as 24 hours. The radiation exposure was conducted with Co^{60} at a dose rate of 30 R/hr to give 720 R for a 24-hour exposure. Experiments were made with centrifuged, irradiated, centrifuged and irradiated, and the control. Egg production and hatchability were decreased for the combination exposure of increased gravity and radiation below the records for either radiation or centrifugation alone. Experiments were also made to test the radiation and prototype packages under simulated space flight conditions. These conditions were: simulated flight profile, irradiation, combined effects of profile and radiation, and control. Wasp survival was good except in the 1000 R position where wasps were pulverized during the simulated reentry vibration testing. E.E.B.

N65-28539*# Naval School of Aviation Medicine, Pensacola, Fla.
EVALUATION OF SOME ANTIMOTION SICKNESS DRUGS ON THE SLOW ROTATION ROOM (NO. 1)
Charles D. Wood, Ashton Graybiel, Robert G. Mc Donough, and Robert S. Kennedy 29 Mar. 1965 10 p refs Joint report with NASA *Its* Rept.-110
(NASA Order R-93)
(NASA-CR-63800; NSAM-922) CFSTI HC $1.00/MF $0.50 CSCL 06O

A series of antimotion sickness drugs was evaluated on the human centrifuge. The procedures used enabled the same stimulus to be applied to the individual subjects through the series of drug tests. A combination of hyoscine and d-amphetamine was found to be the most effective preparation. Hyoscine alone was the most effective single drug followed by d-amphetamine and meclizine. Prochlorperazine was slightly effective, but chlorpromazine, thiethylperazine, and trimethobenzamide were ineffective. Hyoscine alone produced pronounced drowsiness. The combination with d-amphetamine relieved this side effect but not the vertigo and dry mouth. The advantages of the human centrifuge in the testing of antimotion sickness drugs are pointed out. Author

N65-28590# National Research Council of Canada, Ottawa (Ontario).
EXPERIMENTS ON THE PERCEPTION OF ULTRA-SHORT-WAVES BY BIRDS [VERSUCHE ZUR WAHRNEHMUNG VON ULTRAKURZWELLEN DURCH VOGEL] Technical Translation

G. Kramer 1964 8 p refs Transl. into ENGLISH from Vogelwarte (Stuttgart), v. 16, no. 2, 1951 p 55–59
(NRC-TT-1162)

Night migrating song birds, specifically red-backed shrikes, were conditioned by means of the condition reflex method to the decimeter waves emitted continuously by a weak transmitter to determine the methods by which night migratory birds orient themselves. The transmission frequency was 520 mc. The antenna emission power was approximately three to six watts. In the various conditioning methods employed, the birds were conditioned not only to the radiation, but also to an accompanying stimulus which the birds could be assumed to perceive. In all tests the transmitter was set up so that the observer could be certain that the emission was taking place by observing the deflection of a meter. Tests were performed on perching birds and also birds in flight. A discussion of the tests is given with a conclusion of negative results. N.E.A.

N65-28642# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PHYSIOLOGIC REACTIONS OF ANIMALS DURING FLIGHTS ON THE THIRD, FOURTH, AND FIFTH SATELLITE SPACESHIPS

O. G. Gazenko, I. I. Kas'yan, A. R. Kotovskaya, Ye. M. Yuganov, and V. I. Yazdovskiy 26 Jan. 1965 23 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 4, 1964 p 497–511
(FTD-TT-64-360; AD-615525)

Flights of experimental animals in near-earth space on satellite spaceships showed an absence, during and after flight, of pathological changes in system of blood circulation and breathing. Functional shifts of basic physiologic functions of animals turned out to be the most expressed during entry of ship into orbit and descent of it to earth. In period of weightlessness, the indices of cardiovascular system for majority of dogs already in the 2–3rd turns were lowered to initial magnitudes. In state of weightlessness, both curtailing and quickening of breathing was noted. Author

N65-28700# Joint Publications Research Service, Washington, D. C.

BIOLOGICAL ACTION OF ULTRASOUND AND SUPER-HIGH FREQUENCY ELECTROMAGNETIC OSCILLATIONS

A. A. Gorodetskiy, ed. 30 Jun. 1965 143 p refs Transl. into ENGLISH of the booklet "Biologicheskoye Deystviye Ultrazvuka i Sverkhvysokochastotnykh Elektromagnitnykh Kolebaniy" Kiev, Akad. Nauk Ukr. SSR, 1964 p 3–120 (JPRS-30860; TT-65-31380) CFSTI: $4.00

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1. EFFECT OF IRRADIATION BY ULTRASONIC WAVES ON THE MORPHOLOGICAL COMPOSITION AND ON CERTAIN PHYSICO-CHEMICAL PROPERTIES OF THE BLOOD OF ANIMALS S. A. Bershteyn p 2–20 refs (See N65-28701 17-04)

2. ACTION OF ULTRASOUND ON THE METABOLISM OF NUCLEIC ACIDS N. Ye. Khursin p 21–34 refs (See N65-28702 17-04)

3. MORPHOLOGICAL CHANGES OF TESTES CAUSED BY THE INFLUENCE OF ULTRASOUND V. M. Andrianov p 35–54 refs (See N65-28703 17-04)

4. ULTRA-ACOUSTIC PARAMETERS OF THE BLOOD IN THE DYNAMICS OF ACUTE RADIATION SICKNESS I. R. Yevdokimov p 55–72 refs (See N65-28704 17-04)

5. THE THERMAL EFFECT OF THE ACTION OF A SVCH (SUPER-HIGH FREQUENCY) ELECTROMAGNETIC FIELD ON ANIMALS AND CERTAIN PROBLEMS OF DOSIMETRY OF A SVCH FIELD V. I. Mirutenko p 73–94 refs (See N65-28705 17-04)

6. EFFECT OF SVCH ELECTROMAGNETIC FIELD ON THE REPRODUCTION, COMPOSITION OF PERIPHERAL BLOOD, CONDITIONED REFLEX ACTIVITY, AND MORPHOLOGY OF THE INTERNAL ORGANS OF WHITE MICE S. F. Gorodetskaya p 95–107 refs (See N65-28706 17-04)

7. THE PROBLEM OF MICROWAVE LESIONS OF THE SKIN A. A. Slabospitskiy p 108–126 refs (See N65-28707 17-04)

8. THE EFFECT OF SUPER-HIGH FREQUENCIES OF AN ELECTROMAGNETIC FIELD ON THE ACTIVITY OF POLYNUCLEASES AND CONTENT OF NUCLEIC ACID N. I. Kerova p 127–139 refs (See N65-28708 17-04)

N65-28701 Joint Publications Research Service, Washington, D. C.

EFFECT OF IRRADIATION BY ULTRASONIC WAVES ON THE MORPHOLOGICAL COMPOSITION AND ON CERTAIN PHYSICO-CHEMICAL PROPERTIES OF THE BLOOD OF ANIMALS

S. A. Bershteyn *In its* Biol. Action of Ultrasound and Super-High Freq. Electromagnetic Oscillations 30 Jun. 1965 p 2–20 refs (See N65-28700 17-04) CFSTI: $4.00

Irradiation of animals with ultrasonic sound caused changes in the resistance of erythrocytes and the morphologic composition of peripheral blood with the degree of change being dependent on the intensity of the ultrasonic oscillations. Changes in the morphologic composition of peripheral blood occurred soon after irradiation and were moderately pronounced. The blood morphology was completely normalized from 10 to 15 days after irradiation. Irradiation intensities of 3 watts per square centimeter had the most pronounced effect on blood morphology. Irradiation intensities of 1 and 3 watts per square centimeter caused distinct pathomorphologic changes in internal organs, with the most pronounced changes occurring in areas of direct contact with the emitter. Reticulocytosis, the division of red propagules in bone marrow, the change in erythrocyte geometric form, and focal changes of parenchyma in the spleen and liver indicate a connection between changes in the blood and the functional state of hemopoietic and blood destroying systems. R.N.A.

N65-28702 Joint Publications Research Service, Washington, D. C.

ACTION OF ULTRASOUND ON THE METABOLISM OF NUCLEIC ACIDS

N. Ye. Khursin *In its* Biol. Action of Ultrasound and Super-High Freq. Electromagnetic Oscillations 30 Jun. 1965 p 21–34 refs (See N65-28700 17-04) CFSTI: $4.00

A study to determine the mechanism of changes in the content of nucleic acids in the testes of white rats under the influence of ultrasonic sound and heat, and to determine the metabolism of nucleic acids in dynamics is presented. Ultrasonic sound at an intensity of 2 watts per square centimeter, with a frequency of 800 kilocycles per second and a 10 minute exposure, caused a regular decrease in the content of nucleic acids in the testes of the white rats. Cooling the testes protected the nucleic acids from the destructive action of the ultrasonic sound, while heating caused an intensified disintegration of the nucleic acids. The thermal factor was concluded to play a leading role in the mechanism of ultrasonic action on the metabolism of nucleic acids. R.N.A.

N65-28703 Joint Publications Research Service, Washington, D. C.

MORPHOLOGICAL CHANGES OF TESTES CAUSED BY THE INFLUENCE OF ULTRASOUND

V. M. Andrianov *In its* Biol. Action of Ultrasound and Super-High Freq. Electromagnetic Oscillations 30 Jun. 1965 p 35–54 refs (See N65-28700 17-04) CFSTI: $4.00

The effects of small intensities of ultrasonic wave irradiation on the morphology of white rat testes were investigated. The ultrasonic effect on morphologic changes was of a phase nature. A buildup of the pathologic process in damaged structures occurred as a result of sonication. An ultrasonic irradiation intensity of 2 and 0.2 watts per square centimeter caused fragmentation of nerve fibers in the testes. An immediate change in the structure of the testes occurred at the time of irradiation. Regeneration processes restored the morphologic changes after 14 days. R.N.A.

N65-28704 Joint Publications Research Service, Washington, D. C.

ULTRA-ACOUSTIC PARAMETERS OF THE BLOOD IN THE DYNAMICS OF ACUTE RADIATION SICKNESS

I. R. Yevdokimov *In its* Biol. Action of Ultrasound and Super-High Freq. Electromagnetic Oscillations 30 Jun. 1965 p 55–72 refs (See N65-28700 17-04) CFSTI: $4.00

Investigations were conducted on the propagation speed of ultrasonic oscillations in intact blood and in blood irradiated with X-rays in vitro, in the peripheral blood of healthy animals and animals with radiation sickness, and on the absorption of ultrasonic energy in the blood of irradiated animals. A deceleration of the propagation of ultrasonic oscillations in the blood was observed in acute radiation sickness. The speed of sound in the blood changes in phases, conforming with periods during the course of radiation sickness. The propagation velocity of ultrasonic oscillations in the blood of irradiated dogs depends on changes in the hemoglobin content, the erythrocyte quantity, and on their volume, specific gravity, and compressibility. Irradiation of whole blood and plasma with X-rays in vitro in doses of 100 and 150 kiloroentgens does not lead to changes of the speed of sound in them. The absorption coefficient of ultrasonic energy in the blood of dogs in acute radiation sickness decreases because of a decrease in hemoglobin content in the blood. R.N.A.

N65-28705 Joint Publications Research Service, Washington, D. C.

THE THERMAL EFFECT OF THE ACTION OF A SVCh [SUPER-HIGH FREQUENCY] ELECTROMAGNETIC FIELD ON ANIMALS AND CERTAIN PROBLEMS OF DOSIMETRY OF A SVCh FIELD

V. I. Mirutenko *In its* Biol. Action of Ultrasound and Super-High Freq. Electromagnetic Oscillations 30 Jun. 1965 p 73–94 refs (See N65-28700 17-04) CFSTI: $4.00

A method of waveguide dosimetry of absorbed energy of the SVCh field of a wavelength of three centimeters in a biological specimen was developed. The magnitude of thermal effect on the SVCh field in conditions of general irradiation is in direct proportional dependency on the magnitude of incident energy. The increase of thermal effect in irradiated tissues of the animal during local irradiation occurs linearly for short exposures (1 to 3 minutes) and is determined by the quantity of energy of the SVCh field absorbed. During prolonged action of an intense SVCh field (3 to 5 minutes) the magnitude of the thermal effect and the distribution of heat in all organs and tissues of the animal is determined by heat regulation and blood circulation. This method for determining the energy absorbed, serves as a basis of dosimetry for the absorbed energy of the SVCh field by the thermal effect of its action in the study of the biological action of this form of energy in experiments on animals. R.N.A.

N65-28706 Joint Publications Research Service, Washington, D. C.

EFFECT OF SVCh ELECTROMAGNETIC FIELD ON THE REPRODUCTION, COMPOSITION OF PERIPHERAL BLOOD, CONDITIONED REFLEX ACTIVITY, AND MORPHOLOGY OF THE INTERNAL ORGANS OF WHITE MICE

S. F. Gorodetskaya *In its* Biol. Action of Ultrasound and Super-High Freq. Electromagnetic Oscillations 30 Jun. 1965 p 95–107 refs (See N65-28700 17-04) CFSTI: $4.00

A study was conducted to compare the effects of a SVCh field with convectional heat on the reproduction, peripheral blood composition, conditioned reflex activity, and morphology of the internal organs of white mice. Changes in the conditioned reflex activity by the SVCh field were more clear-cut and prolonged than by convectional heat. An SVCh field at a PPM of 0.4 watts per cubic centimeter caused definite changes in the reproduction of both males and females and in the peripheral blood composition. The female sex organs were more sensitive to the SVCh field irradiations. Convectional heat exposure caused disturbances in the morphology and sex organs of the mice. Hemodynamic disorders also developed in the early periods after exposure. Changes in the peripheral blood composition by the SVCh field lead to a decrease of leukocytes, hemoglobin, and erythrocytes directly after irradiation. Normalization was restored by the 10th to 15th day after irradiation. The effects of convectional heat on the peripheral blood composition were less and recovery faster than with SVCh field. R.N.A.

N65-28707 Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF MICROWAVE LESIONS OF THE SKIN

A. A. Slabospitskiy *In its* Biol. Action of Ultrasound and Super-High Freq. Electromagnetic Oscillations 30 Jun. 1965 p 108–126 refs (See N65-28700 17-04) CFSTI: $4.00

Skin lesions on white rats and rabbits caused by microwaves 3 centimeters in length were investigated. Upon exposure to microwaves, the skin temperature of the animals increased, with all layers of the skin being heated equally. During the microwave exposure at a power flux density of 0.5 watts per square centimeter for three minutes, a pathological focus appeared on the skin characterized by disinnervation, persistent stasis on the exposed area, and necrobiotic processes with an outcome of mumification. However, exposure to microwaves of the same intensity but with the skin heating eliminated, did not produce pathological changes. The skin lesions appear to be the result of the action of heat given off during the absorption of the microwave energy by the skin tissues. R.N.A.

N65-28708 Joint Publications Research Service, Washington, D. C.

THE EFFECT OF SUPER-HIGH FREQUENCIES OF AN ELECTROMAGNETIC FIELD ON THE ACTIVITY OF POLYNUCLEASES AND CONTENT OF NUCLEIC ACID

N. I. Kerova *In its* Biol. Action of Ultrasound and Super-High Freq. Electromagnetic Oscillations 30 Jun. 1965 p 127–139 refs (See N65-28700 17-04) CFSTI: $4.00

The effects of super-high frequencies from an electromagnetic field on the nucleic acid metabolism of white rats were investigated. Radio waves 3 centimeters in length at a power flux density of 0.5 and 0.1 watts per cubic centimeter and radiated for a period of six minutes, caused changes in the nuclein metabolism of the skin and internal organs of white

rats. The changes were manifested in some inactivation of RNA-ase and DNA-ase, and in an increase of RNA content and a decrease in DNA content. The activation of RNA-ase and DNA-ase was observed immediately after irradiation and was caused by the stimulating effect of the radio waves. The radio waves exerted no specific effect which is shown by the analogous nature of the changes in the activity of the polynucleases and the content of nucleic acids under their effect. R.N.A.

N65-28750*# National Aeronautics and Space Administration, Washington, D. C.

SYMPOSIUM ON THE ANALYSIS OF CENTRAL NERVOUS SYSTEM AND CARDIOVASCULAR DATA USING COMPUTER METHODS

Lorne D. Proctor, ed. (Henry Ford Hosp.) and W. Ross Adey, ed. (Calif. Univ. Med Center) 1965 492 p refs Symp. held at Washington, D. C., 29–30 Oct. 1964
(NASA-SP-72) CFSTI: HC $4.50/MF $2.50 CSCL 06B

This article covers neurological and cardiovascular research and the acquisition and treatment of such research data by computer methods. For individual titles see N65-28751–N65-28777.

N65-28751* Aix-Marseilles Univ. (France). Neurobiology Lab.

VISUALLY-EVOKED POTENTIALS RECORDED TRANSCRANIALLY IN MAN

Henri Gastaut and Henri Regis *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data using Computer Methods 1965 p 7–34 refs (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50
(Grants PHS MH-03258; AF-AFOSR-62-74)

A brief description of an investigation to study visually-evoked potentials recorded transcranially in man is presented. The apparatus and techniques used in the study are described. Discussions are given on: (1) mean visually-evoked potential in healthy subjects under standard conditions; (2) mean visually-evoked potential in the healthy subjects when experimental conditions vary, and (3) mean visually-evoked potential of pathological subjects. It is shown that the most constant and significant wave of the mean visually-evoked potential is one designated wave V. A discussion of its significance is presented. N.E.A.

N65-28753* Loma Linda Univ., Calif. Dept. of Gynecology and Obstetrics.

COMPUTER METHODS IN THE STUDY OF FETAL DISTRESS

Edward H. Hon *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data using Computer Methods 1965 p 53–71 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

A study of the use of computer methods to elucidate problems in obstetrics concerning prenatal mortality and morbidity is presented. The study is concerned primarily with monitoring the fetus during the period of labor and delivery. The overall problem of fetal distress is outlined and the approach to the problem is discussed. The approach used in studying fetal electrocardiogram and its relation to fetal heart rate patterns, uterine contraction and umbilical compression is discussed in detail. The computer role in data acquisition and data handling in the study is described. N.E.A.

N65-28755* Minnesota Univ., Minneapolis. School of Physics.

ELECTROGRAPHIC FORMATS TO CONFORM WITH BIOPHYSICAL RESEARCH REQUIREMENTS

Otto H. Schmitt *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 95–109 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

This paper gives an account of the interphase between the biophysical instrumentation problem, the research worker, and the interpretation of data. Examples of electrographic formats used in examining experiments are given. N.E.A.

N65-28756* California Univ., Los Angeles. Brain Research Inst.

CONCEPTS OF CEREBRAL ORGANIZATION ARISING FROM TIME SERIES ANALYSIS OF NEUROPHYSIOLOGICAL DATA

W. Ross Adey *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 113–139 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

This paper is concerned with experiments which have been done in animals to try to elucidate some problems of the origin of the EEG wave process. Two approaches were used in this study. One has been to seek evidence of shared activity in both linear and nonlinear relations within and between brain regions that form part of a common system. The second technique has been to look at the level of single cells for evidence in intracellular recordings of EEG as recorded in the domain as a whole. Techniques of impedance measurement which are thought to relate to the frame of structure organization of brain tissue have also been used. In order to detect patterns in EEG waves, a variety of computing techniques, which range from simple averaging over quite long periods, usually two seconds, to the more complex aspects of cross-spectra and spectral contours, have been used. N.E.A.

N65-28757* Gaustad Mental Hospital, Oslo (Norway). EEG Lab.

COLLECTION OF NEUROPHYSIOLOGICAL AND CARDIOVASCULAR DATA WITH DATA REDUCTION, PATTERN AND CORRELATION ANALYSIS

Carl W. Sem-Jacobsen and Edmund Kaiser *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 141–147 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

Principles and tools have been developed for collecting from prolonged flights (simulated and actual) neurological and cardiovascular data, as well as behavioral and environmental data, and to follow biological and behavioral changes and relate these changes to environmental stress. This paper discusses an approach to advanced analysis of sequential signatures in the changes of these biological data that correlate with the subject's behavior under rest and under stress. N.E.A.

N65-28758* California Univ., Berkeley.

HEMODYNAMIC EVALUATION OF PRIMATES BEFORE, DURING AND AFTER LONG PERIODS OF WEIGHTLESSNESS

Nello Pace *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 149–163 (See N65-28750 17-40) CFSTI: HC $4.50/MF $2.50

The problem discussed in this paper is the attempt to evolve a technique for measuring hemodynamic function

before, during, and after long periods of weightlessness in an earth-orbiting satellite. Specifically discussed is progress in automating hemodynamic data collection in a completely unattended primate (explicitly, the pig-tailed monkey, Macaque nemestrina). Descriptions of the configurations of the experimental environments are given and techniques and instruments used in measuring the vascular parameters are discussed.
N.E.A.

N65-28759* Baylor Univ., Houston, Tex. College of Medicine
DATA PROCESSING OF PSYCHOPHYSIOLOGICAL RECORDINGS
Neil R. Burch *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 165–180 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

An attempt is made at analyzing one of the tapes from the normative library of EEGs with a developed method of period analysis of the EEG and modified period analysis of other psychophysiological signals. A psychophysiological study and data are presented concerning both the analysis of the single channel EEG on one of these tapes and the Galvanic Skin Response. Some data generated from sleep studies recently completed are also presented. A brief discussion is given on the concept of a total data reduction system and the analytical principles involved in the method of period analysis.
N.E.A.

N65-28760* National Inst. of Neurological Diseases and Blindness, Bethesda, Md.
HUMAN-AIDED COMPUTER ANALYSIS OF MORPHOLOGICAL DATA
Lewis E. Lipkin *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 181–202 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

A discussion is presented on an effort to construct a general-purpose morphological analyzer and synthesizer which will have as its input either micro-photographs or actual slides for analysis of morphological data. The proposed system will have as additional inputs typewritten English (or really pseudo-English) and a light pen acting upon a very high-resolution screen. The concept of a computer linguistic procedure in the analysis of morphological data and the difficulties encountered in such a system are presented. N.E.A.

N65-28761* School of Aerospace Medicine, Brooks AFB, Tex.
AUTOMATED ANALYSIS OF HEART-RATE PATTERNS FOR BIOMEDICAL MONITORING
David G. Simons *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 205–224 refs (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

This is a progress report on heart-rate computer programing and a review of the patterns upon which the program is based. The first part of this report discusses heart-rate patterns which include base heart-rate and two major types of heart reflex activity, one due to peripheral servomechanism type responses, and the other due to Pavlovian orienting reflex. Two specific heart-rate reflex activity patterns of the peripheral servomechanism type are discussed in detail. These are respiratory heart-rate reflexes and nonrespiratory heart-rate reflexes. The last part of this report is concerned with a computer program for analysis of respiratory patterns and the line of research being followed for heart-rate programing.
N.E.A.

N65-28762* California Univ., Los Angeles. Brain Research Inst.
SYSTEM APPROACH TO NEUROPHYSIOLOGICAL DATA ACQUISITION
Daniel Brown and Raymond Kado *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 225–236 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

A discussion of the evaluation of tools in neurophysiological data acquisition is presented. Emphasis is placed on the general purpose digital computer as the primary tool for data acquisition. Problems in data acquisition, particularly problems related to noise and the systematic approach used in dealing with these noise problems are discussed. N.E.A.

N65-28763* Baylor Univ., Houston, Tex. Inst. for Rehabilitation and Research.
CONSIDERATIONS IN USE OF INFORMATION PROCESSING TECHNOLOGY IN CLINICAL INVESTIGATIONS
William Spencer, David Cardus, and Carlos Vallbona *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 237–257 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

Studies of the effect of bedrest recumbency upon some parameters of physiologic function are reported. A major effort in the study has been to quantitate the effect of bedrest recumbency upon cardiovascular responses to passive tilting and bicycle exercise. Analytic and interpretive problems in the analysis of cardiodynamic responses to passive tilt are described. A large part of the discussion is concerned with some examples of the use of information processing technology in these studies. N.E.A.

N65-28764* Henry Ford Hospital, Detroit, Mich. Dept. of Neurology and Psychiatry.
STATISTICAL LIMITS ON COMPUTER-DEFINED EEG PATTERNS RELATED TO BEHAVIOR
Wilbur R. Mc Crum and Lorne D. Proctor *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 259–266 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

A study of the possible relationship between the electroencephalogram and programed task performance of monkeys during a simulated 48-hour orbit is reported. A method of statistical analysis of the EEG patterns collected from the study, using a digital computer system, is described. The sequence through which the final computer system was derived to analyze the EEG data is presented. N.E.A.

N65-28766* California Univ., Los Angeles.
DEFINITION OF PARAMETERS FOR COMPUTER ANALYSIS OF NEUROPHYSIOLOGICAL DATA
Donald O. Walter and J. M. Rhodes *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 281–292 Prepared jointly with New Mexico Univ. (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

EEG data from the normative library of EEGs were analyzed by an elaborate process of spectral analysis to indicate neurological relationships. The digital computer analysis of the EEGs is based on frequency analysis and its extension, spectral analysis. Reasons for the selection of the spectral analysis method for the analysis of the EEGs are presented. Physiological findings which came from the analysis of the normative library material through the process of spectral analysis are discussed. N.E.A.

N65-28767* Air Force Cambridge Research Labs., Bedford, Mass. Data Sciences Lab.
IMPLICATIONS FOR ELECTROPHYSIOLOGY OF A MODEL OF GLOBAL FUNCTION USING SIMPLE SIMULTANEITY
Harry Blum *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 293–304 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

Classes of brain models are outlined as an approach to brain function studies. The models are aimed at tying EEG to function and suggesting experimental direction. Attention is called to a set of implicity hypotheses which have underlain much experimental nerve physiology in the past and which have been built from ancient models of quite simple nervous systems. A discussion of the function the models are designed to perform is given. N.E.A.

N65-28768* Baylor Univ., Houston, Tex. Coll. of Medicine.
TECHNICAL DETAILS OF DATA ACQUISITION FOR THE NORMATIVE ELECTROENCEPHALOGRAPHIC REFERENCE LIBRARY
Peter Kellaway *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 305–310 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

This paper reports a project to create a tape library which would serve as a normative or baseline for the development of automatic analysis techniques applicable to monitoring central nervous system function during space flights. The subjects used in this study are flight personnel on active duty whose ages range from 25 to 35 years. The majority are pilots. The magnetic tape recordings from each subject contain 18 channels of EEG, two channels of electro-oculogram, and one channel each of electrocardiogram, electromyogram, impedance pneumogram, digital plethysmogram, skin temperature and basal skin resistance. A description is given of the objectives set up by the committee which were thought to measure all important EEG and psychophysiological data on a large number of subjects under identical conditions in a form easily usable by other investigators. The immediate product of the project has been the determination of normative EEG data in a selected group under conditions of various states of sleep and wakefulness. N.E.A.

N65-28769* Baylor Univ., Houston, Tex. Inst. for Rehabilitation and Research.
COMPUTER ANALYSIS OF THE EFFECTS OF BEDREST ON CARDIAC DYNAMICS
Carlos Vallbona *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 311–331 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

Studies of the effect of bed rest were conducted to: (1) attempt to quantitate the degree of cardiovascular deconditioning occurring as a result of bed rest of variable duration; (2) test specific hypotheses on the mechanisms of orthostatic hypotension; (3) evaluate the information provided by direct techniques of measurement of the cardiac cycle and its phases; and (4) evaluate the possible effect of isometric exercise offsetting the deleterious effects of bed rest. A description is given of the experiment design and data processing system. Results of some of the tests performed in the study are given. N.E.A.

N65-28770* Maryland Univ., College Park. Space Research Lab.
EXPERIMENTAL ANALYSIS OF COMPLEX BEHAVIORAL REPERTOIRES UNDER CONTINUOUS ENVIRONMENTAL CONTROL
Joseph V. Brady and William Hodos *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 339–356 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

This paper briefly reviews some of the activities at the Space Research Laboratory at the University of Maryland and emphasizes the current research efforts that are related to performance analysis of potential relevance to the biosatellite program involving animal preparations. Attention is focused on the development of behavioral assessment techniques under continuous environment control so that animals could be worked with for extended periods without having to be manipulated to get some ideas of their performance capabilities in a variety of conditions. N.E.A.

N65-28771* California Univ., Los Angeles. Brain Research Inst.
BIOSATELLITE PERFORMANCE SIMULATIONS
W. Ross Adey *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 357–384 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

This paper briefly discusses those aspects of the biosatellite experiment which are performed from the viewpoint of the simulations that can be performed on earth. Anticipated problems in the development of the experiment and the areas of satisfactory consolidation in its present status are indicated. The biosatellite experiment has been designated P-1001, and was originally conceived as a primarily central nervous system experiment on the status of the animal in the brain function as measured by the EEG with associated task performance. It has been expanded to include a series of cardiovascular monitors. A discussion is given on the changes induced in the primate central nervous system and in the cardiovascular functions in space. N.E.A.

N65-28772* California Univ., Los Angeles. Brain Research Inst.
BIOSATELLITE PROGRAM
Donald O. Walter *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 385–395 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

A 12 to 15-pound Nemestrina monkey bearing sensors of cerebral, cardiovascular and behavioral functions is scheduled for an approximately 30-day mission. Placement of the sensors, training of the monkey, development and production of the signal conditioning equipment, and analysis of the data have all been assigned to the Space Biology Laboratory of UCLA. This paper is concerned primarily with the analysis of EEG and other physiological data presumably available from this monkey. The methods proposed to apply to the EEG data are spectral analysis and cross-spectral analysis frequency. A description of these methods is given. N.E.A.

N65-28774* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE RELATIONSHIP BETWEEN EVOKED MYOGRAPHY AND DIFFERENT STATES OF CONSCIOUSNESS

Jorge Huertas *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 411–419 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

This paper is concerned with determining whether or not there is any relationship among the different stages of consciousness, the electroencephalogram and the electromyogram. Experiments were performed on 30 monkeys. The results of the experiments indicate that if evoked myography is elicited by stimulation of a mixed nerve, a monosynaptic reflex is obtained in the process. This reflex can be studied very precisely if the stimulus is applied by means of permanently embedded electrodes in the ulnar nerve and recorded from the adductor. If the stimulation of the nerve resembles the technique used in obtaining strength duration curves, the classical Hoorveg–Weiss curves are obtained which are different for the anesthetized animal, for the awake animal and for the sleeping animal. The curve for sleep can be subdivided into smaller curves corresponding to the different phases of sleep. Thus, evoked myography offers a unique method for determining sleep quantitatively in time and phase, rather than qualitative as has been done so far. The application of this method to astronautics will provide a simple and reliable tool for a quick evaluation of an organism in regard to its sleep or wakefulness. N.E.A.

N65-28775* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

THE NORMATIVE ELECTROENCEPHALOGRAPHIC DATA REFERENCE LIBRARY

Lawrence F. Dietlein, Robert L. Maulsby, and Peter Kellaway *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 421–432 Prepared jointly with Baylor Univ. (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

This paper presents the program used in establishing the normative electroencephalographic data reference library. Two hundred volunteer flight personnel on active duty in the Air Force were used in the study. Their ages ranged from 30 to 35 years. The majority of the subjects were pilots, but a certain number of navigators and electronic warfare officers were included in the group. All subjects underwent an extensive medical and psychological evaluation before the recording session. The physiological parameters recorded from each subject include 18 derivations of EEG, two derivations of electro-oculogram, electrocardiogram, electromyogram, skin temperature, respiration, finger plethysmogram, and galvanic skin response. Descriptions are given of the manner in which the electrodes and transducers are attached to the subjects, the recording chamber, and the manner in which stimuli are applied to the subjects. A discussion is given on the spectrum of physiological and psychological situations, ranging from rest and relative boredom through reception of sensory stimuli to solving increasingly difficult discriminative mental tasks, that the subjects underwent. N.E.A.

N65-28776* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

TECHNICAL DETAILS OF DATA ACQUISITION FOR NORMATIVE EEG REFERENCE LIBRARY

Lawrence F. Dietlein and Martin H. Graham *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 433–440 Prepared jointly with Rice Univ. (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

The instrumentation system for collecting the normative EEG library is an attempt to meet all the objectives initially set by a committee. These objectives were to record, in form easily usable by other investigators, all the interesting measurable data on a large number of subjects under identical conditions. The objectives of all the interesting data are presented. The number of subjects was set at 200. The technical details of data acquisition and a description of the instrumentations are presented. It is concluded that the desired information has been recorded in a manner that permits it to be reproduced on standard equipment and treated as if it were generated in the investigator's own laboratory. N.E.A.

N65-28777* Stanford Univ., Calif. Div. of Neurology.

COMPUTER-AIDED ANALYSES OF BRAIN ELECTRICAL ACTIVITY

Frank Morrell and Lenore Morrell *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 441–478 refs (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

The studies described on computer-aided analysis of brain activity are interrelated and fall into readily definable categories. These include: (1) relation of background EEG to vigilance behavior; (2) relation of evoked potentials to reaction-time behavior; (3) period analysis of presignal background EEG; (4) sensory interactions at cortical, electrophysiological level; and (5) observations on the spatial distribution of evoked potentials: implications for models of neuronal function and for the detailed study of naturation and of certain clinical conditions. These studies are discussed separately. Some concerning the relationship between EEG potentials recorded from persons performing simple detection-response tasks and the level of performance in those tasks are outlined. N.E.A.

N65-28803# Bureau of Social Science Research, Inc., Washington, D. C.

CONCEPTS AND INDICATORS IN STUDIES OF BEHAVIOR UNDER STRESS

Samuel Z. Klausner Oct. 1964 59 p refs
(Contract AF 49(638)-992)
(AD-610808)

The reasoning between concepts and indicators, a typology of concept–indicator relations, and the occurrence of various types of inference are presented. Examples of each type of indicator–concept inference are provided. Twelve hundred and twenty-six such concepts, their referents and their associated indicators were collected from literature on human behavior in stressful situations. Each was classified as functional, set, or symbolic. The case of joint change, transformation, and the attributive case are discussed for the functional relation; the monadic, patterned, and the attributive case are considered for the attributive case. E.E.B.

N65-28808# Joint Publications Research Service, Washington, D. C.

STUDIES IN ELECTRONARCOSIS

M. G. Anan'yev, A. M. Geselevich, and Yu. Ya. Gritsman, ed. 12 Jul. 1965 28 p refs Transl. into ENGLISH from the book "Sovremennaya Tekhnika v Khirurgii: Materialy VI Nauchnoy Sessii NIIEKha i I" Moscow, 1965 p 90–99 and p 162–168 (JPRS-31018; TT-65-31516) CFSTI: $2.00

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N65-28815# National Research Council of Canada, Ottawa (Ontario).

ON THE QUESTION OF THE "PERCEPTION" OF ULTRASHORTWAVES BY MIGRATORY BIRDS [ZUR FRAGE DES "WAHRNEHMENS" VON ULTRAKURZWELLEN DURCH ZUG–VOGEL]

J. Schwartzkopff 1964 5 p refs Transl. into ENGLISH from Die Vogelwarte (Germany), v. 15, no. 3, 1950 p 194–196 (NRC-TT-1161)

Possible causes were examined for the apparent startling of migratory birds when encountering a radar beam. The release of neural or physiological sensory reactions on exposure to ultra-short electromagnetic waves is one explanation considered and discussed. M.R.W.

N65-28817# Israel Program for Scientific Translations, Ltd., Jerusalem.

PHOTOSYNTHETIC BACTERIA

E. N. Kondrat'eva 1965 247 p refs Transl. into ENGLISH of the book "Fotosinteziruyushchie Bakterii" Moscow, Izd. Akad. Nauk SSSR, 1963 Publ. for AEC and NSF (TT-AEC-tr-6203)

The distribution, role in nature, isolation, cultivation, morphology, cell chemical composition, pigmentation, physiology, initial photosynthetic stages, and taxonomy of photosynthetic bacteria are presented. R.N.A.

N65-28872*# Naval School of Aviation Medicine, Pensacola, Fla.

HABITUATION TO COMPLEX VESTIBULAR STIMULATION IN MAN: TRANSFER AND RETENTION OF EFFECTS FROM TWELVE DAYS OF ROTATION AT 10 RPM

Fred. E. Guedry, Jr. Mar. 1965 32 p refs Joint rept. with NASA *Its* Rept.-109 (NASA Order R-93) (NASA-CR-63865; NSAM-921) CFSTI: HC $2.00/MF $0.50 CSCL 06S

In three experimental runs, a total of 9 men rotated at 10 RPM for 12 days. Control subjects were tested at comparable intervals. Rotating chair tests conducted before and after the 12-day run demonstrated that nystagmus and subjective effects produced by head movements during the accustomed direction of rotation (CCW) had diminished markedly. In the unaccustomed rotation direction (CW) 1 hour after room rotation, nystagmus and subjective reactions approximately equaled reactions prior to the 12-day run. The unequal reduction of reactions was attributed to conditioned compensatory reactions which would facilitate reactions during CW rotation and counteract reactions during CCW rotation. Two days after the 12-day run, responses to both rotation directions were suppressed as compared with initial levels of response; compensatory reactions had apparently dissipated. Some response decline was still present 3 weeks after the 12-day run, but tests after 3 months revealed considerable recovery toward initial response levels. Reactions to passive whole-body angular acceleration were not greatly altered by the 12-day run. Author

N65-28878# Joint Publications Research Service, Washington, D. C.

OXYHEMOGRAM RECORDING ON AN OSCILLOGRAPH FOR DETERMINING BLOOD FLOW TIME

V. A. Degtyarev 15 Jul. 1965 6 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 9, no. 2, Mar.–Apr., 1965 p 79–81 (JPRS-31,093; TT-65-31591) CFSTI: $1.00

A method is described for determining blood flow time by recording the oxyhemogram on the tape of an oscillograph on which a pneumogram is recorded simultaneously. A sample of such a simultaneous oxygen–pneumogram recording at a tape-movement rate of 3.5 mm/sec is shown. The oxyhemogram is recorded by means of the attachment which is described in detail. The pneumogram is recorded by a carbon pickup cut into the bridge circuit of the oscillograph unit. One advantage of this method is that other physiological parameters may be recorded on the oscillograph simultaneously with the oxyhemogram and pneumogram, such as electrocardiogram, arterial pressure, pulse rate, etc. The high speed of the tape-winding mechanism of the oscillograph may also be used with success for analyzing rapid fluctuations of oxygen saturation of the arterial blood. E.E.B.

N65-28883# Atomic Weapons Research Establishment, Aldermaston (England).

CHELATING AGENTS. PART 2: RADIOELEMENT REMOVAL AND THE STRONTIUM-90 PROBLEM

J. H. Grimes, A. J. Huggard, and K. T. B. Scott Apr. 1965 43 p refs (AWRE-O-4/65) HMSO: 6s

The radioelements which at present constitute hazards to humans are considered with respect to their behavior in the body. Theoretical considerations for their removal from blood and from bone are presented, and suggestions are made for the properties of a suitable chelating agent. Chelation with the alkaline earth metals is discussed and the possibilities of obtaining a strontium-preferring chelating agent are outlined. Author

N65-28885# Atomic Weapons Research Establishment, Aldermaston (England).

THE DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION OF THE PARTICULATE MATERIAL COLLECTED DURING THE DOUBLE TRACKS AND CLEAN SLATE 1 EVENTS OF OPERATION ROLLER COASTER

J. P. Friend and D. M. C. Thomas (Isotopes, Inc.) Feb. 1965 35 p refs (AWRE-O-20/65) HMSO: 5s

The overall size-plutonium distributions for Double Tracks and Clean Slate 1 were determined and found to be the same within experimental error. The distributions are not log-normal and the contradictory estimates of the geometric standard deviation in TG57 from impactors and the deposition model are explained on a rational basis. Author

N65-28921# John B. Pierce Foundation of Connecticut, New Haven.

SKIN AND SUBCUTANEOUS TEMPERATURE CHANGES DURING EXPOSURE TO INTENSE THERMAL RADIATION

J. A. J. Stolwijk and J. D. Hardy Oct. 1964 32 p refs (Contract DA-49-146-XZ-124) (DASA-1566; AD-615477)

Radiometric measurements have been made of the skin temperature changes occurring during irradiation of the body by high intensity thermal radiation with square wave pulses.

The experimental values of skin temperature rise during irradiation were compared with those calculated by the finite differences method for various skin layers with the best available values for optical and thermal properties of each skin layer, using an analog computer. Subcutaneous temperatures can be calculated from surface temperature data; it is indicated that most of the radiation is absorbed in the first 0.05–0.15 mm of skin through combined effects of absorption and scattering. Author

N65-29011# Joint Publications Research Service, Washington, D. C.
A HUMAN EXPOSED TO EXTREME CONDITIONS OF SPACE TRAINING
A. Koreshkov 27 Jul. 1965 6 p Transl. into ENGLISH from Tekhn. Molodezhi (Moscow), no. 6, 1965 p 18–19
(JPRS-31250; TT-65-31747) CFSTI: $1.00

An account of the training, both physically and emotionally, of cosmonauts who will be exposed to conditions of outer space is given. Psychological reactions to parachute jump training are studied, and basic physiological indices of the man are periodically recorded by transmitters attached to their bodies. Other exercises used for training, are diving, ice hockey, and trampolin. The cosmonauts are placed in temperature, pressure, acoustic, solitude, and sensory restriction chambers, and information on their physiological processes are transmitted outside the chamber. Some of the chambers used for testing have special physical exercises, which produce high physiological pressures. L.S.

N65-29032 Czechoslovak Academy of Sciences, Prague.
THE NERVOUS CONTROL OF SKIN POTENTIALS IN MAN
Karel Sourek 1965 96 p refs *Its* Rozpravy Vol. 75, No. 1

Experiments are discussed for cases where the extent and localization of a traumatic or surgical lesion in some part of the nervous system could be verified. Patients with a traumatic lesion of a peripheral nerve, a surgical lesion of the sympathicus, a complete traumatic lesion of the spinal cord, partial surgical lesions of the spinal cord, and patients after removal of certain parts of cerebral hemispheres were observed. It was noted that: (1) After the severence of a peripheral nerve the reflex skin-potential reaction disappears from the affection region. (2) After the severance of the lumbar or thoracic sympathicus the reflex skin-potential reactions disappear from the corresponding region but reappear after some months. (3) The severance of the cervical and thoracic spinal cord results in an immediate and permanent loss of the reflex skin-potential reaction below the level of the lesion. (4) After resections of different parts of cerebral hemispheres there are no major changes in the reflex skin-potential reactions on the periphery. (5) On the periphery both the reflex skin-potential reflex and the evoked skin-potential reaction are transmitted with a small velocity. E.E.B.

N65-29119# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EFFECT OF ADENOSINETRIPHOSPHORIC ACID (ATP) ON THE METABOLISM OF PHOSPHOPROTEINS IN THE LIVER AT RADIATION INFLICTION
R. P. Vinogradova 12 Apr. 1965 11 p refs Transl. into ENGLISH from Ukr. Biokhim. Zh. (Kiev), v. 35, 1963 p 274–279
(FTD-TT-64-1163/1; AD-614962)

The effect of lethal dosages of X-rays on the adenosine triphosphate (ATP) content in the liver and the effect of ATP on the exchange of phosphoproteins in various periods of the radiation illness in guinea pigs were investigated. Approximately 0.35 moles of ATP per 1 gram of incubated normal liver tissue resulted in an increase in the amount and intensity of phosphoprotein phosphorus restoration. The addition of ATP to liver tissue exposed to lethal doses of X-ray radiation had no effect on the content or intensity of phosphoprotein phosphorus restoration. The ATP content in the liver decreases rapidly after exposure to lethal X-ray doses. The maximum reduction in ATP was observed on the tenth day after exposure. The failure of ATP to stabilize the liver of exposed animals may be due to disturbances in the fermentative systems which transfer the excess of phosphoric acid from ATP to phosphoprotein. R.N.A.

N65-29131# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MOLECULAR GENETICS AND THE EFFECTS OF RADIATION ON HEREDITY
N. P. Dubinin 2 Jun. 1964 433 p Transl. into ENGLISH of the book "Molekulyarnaya Genetika i Deystviye Izlucheniy na Nasledstvennost" Moscow, Gosatomizdat, 1963 p 3–239
(FTD-TT-63-1214/1+2; AD-608460)

Current research on molecular genetics is discussed to include the physical and chemical bases of heredity, the deciphering of the genetic code, the influence of radiation on human heredity and molecular genetic structures, and the control of the genetic mutability of organisms. The use of radiation to investigate cellular processes at the molecular level and the experimental approach to genetics by the use of ionizing radiations are emphasized. E.E.B.

05 BIOTECHNOLOGY

Includes life support systems, human engineering, crew training and evaluation, and piloting. For related information see also: 04 Biosciences.

N65-28094# Joint Publications Research Service, Washington, D. C.
TRANSLATIONS FROM BIOFIZIKA, VOLUME 10, NO. 1, 1965
11 Jun. 1965 42 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 10, no. 1, 1965 42 p
(JPRS-30575; TT-65-31249) CFSTI: $2.00

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1. EVALUATION OF THE LIGHT STIMULATOR POSITION AND MOVEMENTS OF THE EYES L. I. Leushina p 1–12 refs (See N65-28095 17-05)
2. SOME INFORMATION ON THE EYE TRACKING SYSTEM A. I. Lauringson and L. P. Shchedrovitskiy p 13–18 refs (See N65-28096 17-05)

N65-28095 Joint Publications Research Service, Washington, D. C.
EVALUATION OF THE LIGHT STIMULATOR POSITION AND MOVEMENTS OF THE EYES
L. I. Leushina *In its* Transl. from Biofizika, Vol. 10, No. 1, 1965 11 Jun. 1965 p 1–12 refs (See N65-28094 17-05)
CFSTI: $2.00

The participation of eye movements in evaluating the spatial position of a light stimulus was investigated based on the concept of reaction time dependency on the amount of information known. An increase in the accuracy of evaluating the

position of the light stimulus resulted in a reaction time increase and also an increase in the evaluation accuracy which was equivalent to a more complicated selection. With the increase in estimation accuracy, the latent period of eye-jump to a new fixation point regularly increased in all tested individuals, while the time interval between the eye-jump and the individual's signal concerning evaluation did not change. A comparison of the moment of signal evaluation with the eye-jump showed that in 25% of the cases the evaluation signal was given prior to the end of eye movements. An increase in the accuracy of evaluating the light stimulus position resulted in a decrease in the variability of the eye-jump amplitude. Eye movements do not determine the perceptions of visual spatial correlations but are its result. R.N.A.

N65-28096 Joint Publications Research Service, Washington, D. C.

SOME INFORMATION ON THE EYE TRACKING SYSTEM

A. I. Lauringson and L. P. Shchedrovitskiy *In its* Transl. from Biofizika, Vol. 10, No. 1, 1965 11 Jun. 1965 p 13–18 refs (See N65-28094 17-05) CFSTI: $2.00

Eye tracking was investigated to establish whether or not smooth eye movement is determined only by the speed of the moving object, and that in tracking an accelerating object, the eye movement consists of individual segments of smooth motion and correcting eye jumps. Test results show that tracking does not consist of segments of movements at constant speed and of jumps, but corresponds to the law of object movements. The tracking is composed of a transitional process and an established movement. At a parabolic entry of an object the transitional process uses smooth eye movement. Smooth movement is used more at the start of tracking an accelerating object than during steady tracking. At greater accelerations the transitional process uses an eye jump along with the initial smooth movement. At an exponential entry, the transitional process always includes an initial smooth tracking and an eye jump. Steady tracking is either accomplished without rectifying jumps or jumps with intervals of one second or longer. The results refute the assumption that a smooth eye movement is determined only be the speed of the object. R.N.A.

N65-28118# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SOME RESULTS AND PROBLEMS OF OBSERVATION UNDER SPACEFLIGHT CONDITIONS

M. M. Kosenkov and A. P. Kuz'minov 14 Jan. 1965 9 p Transl. into ENGLISH from a paper presented at the Third Intern. Symp. on Bioastronautics, San Antonio, Tex., 16–18 Nov. 1964 p 3–7

(FTD-TT-65-1/1; AD-610378)

Soviet scientist and engineers, a specialist in engineering psychology and an ophthalmologist have carried out experimental studies to determine the state of the visual analyzer during space flight under the influence of various types of adverse factors. The experiments were carried out during the Vostok and Voskhod launches. The following objectives were carried out during the experiments: (1) a check of the spectral sensitivity of the eyes under conditions of weightlessness; (2) a check of the visual acuity of cosmonauts both as the vehicle approaches orbit and under conditions of orbital flights; (3) a determination of the possibility of identifying various natural formations on the earth; and (4) a determination of optimum illuminating conditions inside the ship's cabin. Results of the experimental studies are presented. N.E.A.

N65-28287 Joint Publications Research Service, Washington, D. C.

UNPARALLELED SCIENTIFIC EXPERIMENT IN OUTER SPACE: A SOVIET MAN EXITS SPACE SHIP IN OUTER SPACE

M. V. Kel'dysh et al *In its* Misc. Articles in Priroda (Nature, No. 4, 1965) on Space Flight and Physiol. and Med. Develop. p 1–12 (See N65-28286 17-04) CFSTI: $2.00

Presented is an edited transcript of a press conference at which cosmonauts reviewed their experiences in preparation for, and during, the flight of Voskhod-2. Particular emphasis is on the extravehicular experiments by cosmonaut A. A. Leonov. S.C.W.

N65-28297 Joint Publications Research Service, Washington, D. C.

THE EFFECT OF NOISE LEVEL ON WORKING EFFICIENCY

S. D. Kovrigin and A. P. Mikheyev *In its* Studies in Hyg. and Sanit. 9 Jul. 1965 p 17-23 refs (See N65-28294 17-04) CFSTI: $2.00

The effect of noise level on the working efficiency in letter-sorting rooms of post offices is investigated. The results of the investigation indicate that the letter sorter's productivity, apart from other factors, depends to a significant degree on the operative noise levels. The investigation results agree with the data in Soviet and foreign literature regarding the effect of noise on efficiency. The research results also indicate the advisability of setting standards for maximum permissible sound-pressure levels for communications enterprises. N.E.A.

N65-28334# HRB-Singer, Inc., State College, Pa.

UTILITY OF INFORMATION AS A PREDICTOR OF DECISION ADEQUACY

James M. Mc Kendry and Paul M. Hurst Sep. 1964 38 p refs

(Contract Nonr-4441(00))

(Rept.-567-R-2)

Information used to predict decisions is applied to a simple analog of antisubmarine and anti-aircraft situations, with specific applications to the former discussed. In this way, it is possible to express information requirements quantitatively by use of an information-indexing approach, and to provide a commander with a single score which reflects the total utility of all the known information. Information provided to subjects is categorized into types commonly provided by intelligence and surveillance systems. Using expectancy equations, the true value of any item can be computed. Questions relating to the state of nature, judgment accuracy, information index performance values, and the invariance of these performance scores are converted into experimental predictions subjected to traditional hypothesis testing. Apparatus used in the test, and how the examinee's subjective estimates are converted to scores along the utility scale are also described. The appendices deal with theoretical problems and the equations required for their solutions. M.W.R.

N65-28451 Royal Aircraft Establishment, Farnborough (England).

MAN–MACHINE SYNERGY

T. C. D. Whiteside *In* AGARD Proc. of the 14th AGARD Gen. Assembly [1964] p 39–46 (See N65-28450 17-34)

The question of human response and the modification of this response by anatomical, physiological, or psychological origin are examined. The man–machine synergy depends fundamentally upon communication–communication in this sense referring to the exchange of information from man to machine

and from machine to man. In presenting information, maximum use should be made of transfer of training. An instrument which makes use of an aspect of perception which was learned in childhood will have a considerable advantage over one without this association. The plea is made for better communication between man and machine on the basis that more use should be made of man in his ability to make a decision rather than as a complicated sensor responding in a binary system. The time and effort which a highly trained pilot and crew have to put into an extensive preflight check list would seem to be more usefully employed in performing some function making use of judgment and skill at that critical stage of the flight. E.E.B.

N65-28452 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
ADAPTATION OF MAN TO THE MACHINE
Joseph M. Quashnock *In* AGARD Proc. of the 14th AGARD Gen. Assembly [1964] p 47–63 (See N65-28450 17-34)

Protective devices to extend the tolerance limits of crews to aerospace hazards and the simulators to reproduce such hazards at or near ground level for training and research purposes are discussed. Also, certain philosophies which are frequently overlooked in the initial planning stages of research and development are considered. The protection afforded by the pressure suit to low atmospheric pressure, heat, acceleration, and noise is reviewed. Also, the environmental chambers for the evaluation of these devices are included. To prepare man for his future roles in space, the interactions of man's equipment and his environment must be of primary concern. Man's primary piece of space equipment is his pressure suit. Most of this presentation concerns the protection given by this garment. E.E.B.

N65-28453 Aerospace Corp., El Segundo, Calif.
THE ROLE OF THE PILOT IN THE MERCURY AND X-15 FLIGHTS
Walter C. Williams *In* AGARD Proc. of the 14th AGARD Gen. Assembly [1964] p 65–81 refs (See N65-28450 17-34)

The objectives of X-15 were verifications of the predicted hypersonic aerodynamics; the study of aircraft structures in a high heating and loading environment; the investigation of stability and control problems encountered while leaving and entering the earth's atmosphere; and the investigations of problems associated with brief periods of weightlessness. Project Mercury had as a basic objective orbital flight and recovery and the examination of man's capabilities in the space environment. In both programs, one of the important roles of the pilot was systems management. In this area, man's contribution to the success of space flight and the effectiveness of employing redundant systems are emphasized. In the case of the X-15, the contribution of the pilot and redundant systems to the success of the flight program are shown. The control and reference systems used in Mercury; the sequence of the major events for Mercury–Atlas manned orbital missions; the pilot ability to control the attitude of the Mercury spacecraft; and the ability of the pilot to control the X-15 during the boost phase are shown. E.E.B.

N65-28454 Air Force Dept., Washington, D. C.
SOME ASPECTS OF HIGH-SPEED MANNED FLIGHT AT LOW ALTITUDES
James Ferguson *In* AGARD Proc. of the 14th AGARD Gen. Assembly [1964] p 83–89 (See N65-28450 17-34)

The limitations and capabilities for high-speed manned flight at low-altitudes are discussed. Some of the limitations are nature controlled; others are operational. Technology in materials, structures, aerodynamics, and engines generally establish basic speed limitations. Ceiling, visibility, and turbulence can be called nature controlled limitations. Operationally, the defenses, terrain, detection capabilities, crew proficiency, weapon delivery, and mission urgency must be considered. With high speed–low altitude flight, everything possible should be preplanned. Distraction requiring head down in cockpit must be reduced or eliminated. Reaction time is critical. Also, the point is emphasized that man is the key to operations which require judgment, decision, creative intelligence, and flexibility which characterize military situations. E.E.B.

N65-28455 Bundesamt fuer Wehrtechnik und Beschaffung, Koblenz (West Germany).
MAN–MACHINE PROBLEMS IN VTOL AIRCRAFT
Theodor Benecke *In* AGARD Proc. of the 14th AGARD Gen. Assembly [1964] p 91–98 refs (See N65-28450 17-34)

With conventional aircraft the pilot's all important quality has been his flying proficiency. All other activity within the aircraft was limited to watching engine performance parameters, assimilating target optical tracking information and operating the weapons system. With VTOL configurations another category of proficiency is added. Take-off demands careful evaluation of atmospheric conditions prevailing at the time and of aircraft gross weight, and take-off must be accomplished very speedily when it is extremely difficult to check through all systems. Furthermore, the pilot must be capable of hovering, maneuvering the aircraft above ground from one point to another, carefully controlling altitude, transitioning from hover to aerodynamic flight, and vice versa. Control aids for the VTOL pilot, the merits of simulation in VTOL aircraft engineering and pilot training, and experience gained in flying the VJ-101 VTOL aircraft are discussed. Also, the particular problems in training pilots for the VTOL type aircraft are considered. E.E.B.

N65-28456 Sud-Aviation, Paris (France).
'CONCORDE': CONSIDERATION OF THE POINT OF VIEW OF THE RELATIONSHIP BETWEEN MAN AND MACHINE ['CONCORDE': ENVISAGE DU POINT DE VUE DES RELATIONS DE L'HOMME ET DE LA MACHINE]
M. R. Blanchet *In* AGARD Proc. of the 14th AGARD Gen. Assembly [1964] p 99–118 In FRENCH (See N65-28450 17-34)

Problems in passenger transport design associated with transonic and supersonic travel are discussed. The limits imposed on velocity, acceleration, altitude, trajectory, and on the structure and material of the aircraft, by the requirements for passenger safety and comfort are quite different from those involved in subsonic air transportation. Completely automatic function of the aircraft is not possible, and human supervision will continue to be necessary for many control and decision-making operations. The problems are considered in the framework of the French supersonic transport, Concorde, expected to be completed in 1967. Trans. by J.M.D.

N65-28540*# Naval School of Aviation Medicine, Pensacola, Fla.
A NEW QUANTITATIVE ATAXIA TEST BATTERY
Ashton Graybiel and Alfred R. Fregly 19 Mar. 1965 43 p refs Joint Report with NASA *Its* Rept.-107
NASA Order R-93)
(NASA-CR-63803; NSAM-919) CFSTI: HC $2.00/MF $0.50 CSCL 05J

A new multi-dimensional quantitative ataxia test battery employing the "rail method" of testing was developed to

assess more precisely than heretofore postural equilibrium–disequilibrium under unusual conditions and stresses such as rotating environments. High reliability, including test–retest reliability, was demonstrated for each of two versions: a Long Version employing six rails of varying widths, and a Short Version employing two of these rails. Normative standards covering a wide age range, and age, height, and weight influences upon performance, tentative sex differences in performance, practice effects, and Test Battery relationships with several clinical-type ataxia tests were determined. Validity of the standardized test procedures in the laboratory, in the field, and in clinical situations was demonstrated, and present and future uses of the Test Battery in normals and auricular involved individuals in vestibular research as well as in related research-clinical areas were outlined, and several methodological limitations were indicated. Author

N65-28732# Joint Publications Research Service, Washington, D. C.

CYBERNETICS AND THE PROBLEM OF PURPOSE

Ye. Kh. Gimel'shteyb 16 Jul. 1965 11 p refs Transl. into ENGLISH from Nauchn. Dokl. Vysshei Shkoly, Filosofskiye Nauki (Moscow), no. 3, 1965 p 40–47
(JPRS-31124; TT-65-31622)

Philosophical problems of cybernetics are discussed, and the concepts of purpose, purposefulness, and expediency are defined. These concepts are examined in relation to man, his behavior, and his goals, and then related to cybernetic systems devised to model the purposeful actions of man. The point is made that the machine's performance serves as the means for realizing a goal programed by man, and that the machine achieves that goal objectively. Functions of the self-adjusting systems are also discussed, wherein the capacity for adaptation to environment is exhibited. Self-adjusting systems operate expeditiously under statistical searching, governed by the principle of selection. It was concluded that further development of the categories of purpose, purposefulness, and expediency will yield greater insight of cybernetic systems. M.G.J.

N65-28752* Massachusetts General Hospital, Boston. Stanley Cobb Labs.

ON-LINE COMPUTER TECHNIQUES FOR ANALYSIS OF THE VISUAL SYSTEM

Frank R. Ervin *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 35–51 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

An on-line computer technique for fine-grained analysis of the visual cortical neuron and the relationships of its firing to evoked potential and to the resting EEG activity is presented. The PDP-4 general-purpose digital computer used in the study is described. With the aid of a shock-display-sampling system, procedures of how the experiment is carried out are presented. Some of the data that emerge from the kind of system described is compared with classical descriptions from traditional techniques. Figures of the type of responses that were recorded from the visual cells are presented. N.E.A.

N65-28754* Salpetrière Hospital, Paris (France).

TOPOLOGICAL ASPECTS OF THE ORGANIZATION, PROCESSING AND PRESENTATION OF DATA

Antoine Rémond *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 73–93 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

The problems of automatic computer handling of topological studies of the electrical activity of the brain are discussed. Comments are made on topological resolution, on presentation of topograms through time, on amplitude resolution, and data reduction of various kinds. The sensory average evoked potential is used as the main theme of these developments. An intricate description of the practical methods used in the topographic approach to EEG studies is given under the following headings: (1) amplitude relations between derivations; (2) spatiotemperal maps; (3) instantaneous topograms; (4) alpha rhythm patterns; (5) amplitude resolution; and (6) root mean square values reduction. Physiological situations considered were: the effects of the eyelid on topographic changes; and the effect produced by the direction of gaze. N.E.A.

N65-28765* State Univ. of Iowa, Iowa City. Coll. of Medicine.

TOPOSCOPES AS COMPUTER INTERFACES

Harold W. Shipton *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 269–279 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

A multichannel toposcope as an aid to planning computer experiments is described. A technical description of the toposcope and a review of topographic procedure are given. The technique and the topographic approach to the study of EEG are presented. An explanation of the toposcopic device, which has to be constantly watched while the EEG is being made, in preparation for designing an experiment, and in choosing among a variety of possibilities to use the larger computer with different capabilities, is given. N.E.A.

N65-28773* Henry Ford Hospital, Detroit, Mich. Dept. of Neurology and Psychiatry.

THE DEVELOPMENT OF PERFORMANCE TASKS PRODUCING FATIGUE IN MAN AND OTHER PRIMATES

Mary I. Blake and Lorne D. Proctor *In* NASA, Washington Symp. on the Anal. of Central Nervous System and Cardiovascular Data Using Computer Methods 1965 p 397–409 (See N65-28750 17-04) CFSTI: HC $4.50/MF $2.50

This paper gives results of a project designed to see if there are changes in EEG that are consistently associated with fatigue; these changes could then be used as fatigue indicators. A discussion of the development, so far, of tasks and working conditions producing such deterioration is presented. The species used in this project were monkeys, chimpanzees, and humans. This report is based on 160 orbits with five monkeys, 50 orbits with seven humans, and training data from three chimpanzees. Test conditions represent a partial simulation of space flight; that is, all subjects are confined in isolation chambers with controlled sound and constant illumination. Performance tasks and fatigue decrements observed are discussed. N.E.A.

N65-28853*# Kansas State Univ., Manhattan.

ANALYTIC STUDIES IN THE LEARNING AND MEMORY OF SKILLED PERFORMANCE Second Semi-Annual Report, Oct. 1, 1964–Mar. 30, 1965

Merrill E. Noble and Don A. Trumbo 20 Apr. 1965 22 p (Grant NsG-606)
(NASA-CR-63837) CFSTI: HC $1.00/MF $0.50 CSCL 05J

A study was performed to evaluate the role of sequential length on the acquisition and retention of skill when the task involves coherent and partially coherent sequences. Methods and procedures used in the study are presented. Results are given for the first analyses for error scores on the training since the retention phase of the study is not completed. It is suggested that the information provided from this study will aid in the description of the information processing capacities and limitations of the human operator, and his ability to retrieve and use such information after extended periods of disuse. N.E.A.

N65-28868*# Maryland Univ., College Park. Computer Science Center.
AN EMPIRICAL EVALUATION OF LATENT CLASS ANALYSIS
James F. Williams (M. A. Thesis) Jun. 1965 94 p refs
(Grant NsG-398)
(NASA-CR-63870; TR-65-19) CFSTI: HC $3.00/MF $0.75

The purpose of this project is to empirically evaluate the theoretical model of latent class analysis proposed by T. W. Anderson (*Psychometrika*, 1954, 19) to determine if a population of respondents could be divided into a finite number of distinct groups or classes. A basic assumption of the latent class model is that the responses of subjects in the same class to different dichotomous items are statistically independent. Using the manifest probabilities of positive response of the persons in a random sample, the computational method provides estimates of the latent parameters, that is, the proportion of population in each latent class and probability of positive response with each item for each latent class. A history of the development of this topic includes a description of the computational procedures of B. F. Green, Jr. (*Psychometrika*, 1951, 16) and Anderson. A modification of Anderson's is tested using a population of known characteristics. The properties of the solution are described and an evaluation of the method is given. Author

N65-29010# Joint Publications Research Service, Washington, D. C.
CYBERNETIC SYSTEMS COMPONENTS
26 Jul. 1965 152 p refs Transl. into ENGLISH of the book "Elementy Kiberneticheskikh Sistem" Tbilisi, USSR "Metsniyereba" Publishing House, 1964 p 1–173
(JPRS-31240; TT-65-31737) CFSTI: $5.00

A compilation of various studies on the design and application of components and devices for cybernetic systems is presented. Subject matter covered includes the analysis and synthesis of cybernetic systems and devices, some research results on data coding and conversion using digital computers, and methods of improving the reliability of analog-discrete control systems. Among the topics discussed are diode logic elements in printed circuits for microwave applications; tunnel diode circuit stability; voltage-to-code and continuous-to-discrete converters; gray code counters; fast decimal to binary conversion; linear transformations between binary and gray codes; stability of systems with feedback; generation processes in pulse systems with delayed feedback using reflected signals; and number comparisons for computer use. C.T.C.

N65-29063# Joint Publications Research Service, Washington, D. C.
BIOLOGY AND CYBERNETICS
V. Parin et al 12 Jul. 1965 7 p Transl. into ENGLISH from Izvestiya (Moscow), 6 Jun. 1965 p 5
(JPRS-31029; TT-65-31527) CFSTI: $1.00

The application of cybernetics to the field of biology is discussed. Its principle application is the investigation of general laws governing the processes of self-control and self-organization in the living organism. Cybernetics views living organisms as intricate dynamic systems whose constituent parts are interrelated while the organism itself is interrelated to the external world. It conceives all living organisms as a distinctive ladder of living systems at different stages of development. Cybernetic techniques applied to the biological areas of heredity, evolutionary processes, aging, biological rhythms, and the automatic control of biological functions are discussed. R.N.A.

06 CHEMISTRY

Includes chemical analysis and identification (e.g., spectroscopy). For applications see: 17 Materials, Metallic; 18 Materials, Nonmetallic; and 27 Propellants.

N65-28089*# Texas A&M Univ., College Station. Activation Analysis Research Lab.
AN INVESTIGATION OF COMPUTER-COUPLED, AUTOMATIC, REMOTE ACTIVATION ANALYSIS FOR LUNAR SURFACE ANALYSIS Semiannual Report, Nov. 1, 1964–Apr. 30, 1965
Manchery P. Menon, ed. 1 May 1965 65 p refs
(Grant NsG-256-62)
(NASA-CR-63059) CFSTI: HC $3.00/MF $0.75 CSCL 07D

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1. TOLERANCE LEVELS OF INTERFERENCE FROM ONE ELEMENT TO THE OTHER IN 14 MEV NEUTRON ACTIVATION ANALYSIS OF SIMULATED MOON MATRIX M. Y. Cuypers 22 p refs (See N65-28090 17-06)
2. DETECTOR RESEARCH C. F. Lam 12 p refs (See N65-28091 17-14)
3. PRELIMINARY STUDIES ON THE POSSIBLE USE OF SINGLE CHANNEL ANALYZERS FOR THE 14 MEV NEUTRON ACTIVATION ANALYSIS OF THE MAJOR ELEMENTS IN ROCK SAMPLES P. Jimenez and L. E. Fite 11 p refs (See N65-28092 17-06)
4. INSTRUMENTAL ACTIVATION ANALYSIS OF METEORITES, SIDEROLITE AND TEKTITE USING 14 MEV NEUTRONS M. P. Menon 11 p refs (See N65-28093 17-06)

N65-28090* Texas A&M Univ., College Station. Activation Analysis Research Lab.
TOLERANCE LEVELS OF INTERFERENCE FROM ONE ELEMENT TO THE OTHER IN 14 Mev NEUTRON ACTIVATION ANALYSIS OF SIMULATED MOON MATRIX
M. Y. Cuypers *In its* An Invest. of Computer-Coupled, Autom., Remote Activation Analysis for Lunar Surface Analysis 1 May 1965 22 p refs (See N65-28089 17-06) CFSTI: HC $3.00/MF $0.75

Mixtures of aluminum, iron, magnesium, and silicon oxides in proportions corresponding to an average percent of each of the elements in igneous rocks or meteorites were prepared as simulated moon matrices. Each of the elements form radionuclides with differing gamma ray energies and half-lives, upon being activated by 14 MeV neutrons. Samples from the matrices were analyzed by counting for the purpose of finding minimum detectable concentrations, and upper

tolerance limits for each element present in the matrix. In each matrix the concentration of one component was varied, keeping the others in the same ratio. Tables showing photopeak counts for each activated component are given. Results indicate that all five components (including oxygen) can be analyzed easily. Only the magnesium content cannot be precisely measured, but no real interference is present. The only analysis that is sometimes difficult is that of aluminum when the content is too high. L.S.

N65-28092* Texas A&M Univ., College Station. Activation Analysis Research Lab.
PRELIMINARY STUDIES ON THE POSSIBLE USE OF SINGLE CHANNEL ANALYZERS FOR THE Mev NEUTRON ACTIVATION ANALYSIS OF THE MAJOR ELEMENTS IN ROCK SAMPLES
Pedro J. Menez and Lloyd E. Fite *In its* An Invest. of Computer-Coupled, Autom., Remote Activation Analysis for Lunar Surface Analysis 1 May 1965 11 p refs (See N65-28089 17-06) CFSTI: HC $3.00/MF $0.75

Single channel analyzers were used in a detection assembly which counts gamma rays from radionuclides of oxygen, magnesium, aluminum, iron and silicon formed by activation of the elements with 14 MeV neutrons. A block diagram of the detection assembly is shown. Known samples of the elements were activated and counted to study the reliability of the single channel analyzer. Five repetitive runs on a series of silicon samples were made to evaluate the reproducibility of the data, and the runs show that the data are as precise as that made with a multichannel analyzer. Measurements will be made on a group of standard rock samples (containing the above elements) and the analytical results will be compared with multichannel analyses to ascertain whether the single channel analyzers are practical for analyzing rock samples. The analyses are directed toward possible extraterrestrial applications. L.S.

N65-28093* Texas A&M Univ., College Station. Activation Analysis Research Lab.
INSTRUMENTAL ACTIVATION ANALYSIS OF METEORITES, SIDEROLITE AND TEKTITE USING 14 Mev NEUTRONS
M. P. Menon *In its* An Invest. of Computer-Coupled, Autom., Remote Activation Analysis for Lunar Surface Analysis 1 May 1965 11 p refs (See N65-28089 17-06) CFSTI: HC $3.00/MF $0.75

Neutron activation analysis was used for obtaining time-dependent gamma spectra for silicon in siderolite, and tektite meteorite specimens, as a preliminary step towards using this form of instrumental analysis for other elements present in combined form in these and other meteorite specimens. The object is to develop an analysis for extraterrestrial surface samples. Comparisons of time-dependent gamma spectra curves for a siderolite sample and a chondrite sample are shown, and percentage values are given in a table. A method of counting an activated sample, with the data plotted on a linear graph, is considered as an alternate technique that will give good precision and save time in analyzing samples. L.S.

N65-28109# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON REACTIVE DIFFUSION OF BORON AND CARBON IN HIGH-MELTING TRANSIENT METALS
G. V. Samsonov and O. P. Yepik 22 Jan. 1965 7 p refs Transl. into ENGLISH from Dopovidi Akad. Nauk Ukr. RSR (Kiev), no. 1, 1964 p 67–70
(FTD-TT-64-782/1+2; AD-610792)

The diffusion of carbon and born in the transition metals, titanium, zirconium, niobium, tantalum, molybdenum, and tungsten was investigated. The diffusion parameters were determined by metallography, radiography, and chemistry. The previously established dependence between the criterion of acceptor capacity of the d-electron shell of metallic atoms and the magnitude of energy activation was confirmed. E.E.B.

N65-28120# Tyco Labs., Inc., Waltham, Mass.
ELECTROCHEMICAL OXIDATION OF SATURATED HYDROCARBONS Interim Technical Report, 1 Nov. 1964–31 Mar. 1965
S. B. Brummer [1965] 58 p refs
(Contract DA-44-009-AMC-410(T))
(ITR-3; AD-465282)

The adsorption of hydrogen atoms, oxygen, and propane on smooth platinum electrodes in 13-molar phosphoric acid was investigated as a function of potential and temperature. Surface oxidation of platinum increased with temperature, following approximately the changes of the reversible oxygen potential with temperature. No detectable amount of oxide was found in the usual potential region of fuel cell anode operation. The amount of adsorption increased from zero at about 0.1 V to a maximum in the region of 0.2 to 0.3 V and then declined steadily to about zero at 0.7 V. At a given potential, the adsorption is less at 130° C than at 110° C. The material which accumulated on the electrode releases about 2 electrons for each Pt surface atom covered upon oxidation; however, it does not oxidize readily at low potentials. At 130° C, the structure of this material was complex, and although the average oxidation state is similar at potentials anodic to 0.3 V, the structure varied markedly with potential. E.E.B.

N65-28131# India. Dept. of Atomic Energy, Bombay. Spectroscopy Div.
ANALYSIS OF PLATINUM AND PLATINUM RHODIUM ALLOYS
N. A. Narasimhan, V. B. Kartha, T. R. Saranathan, Kumari O. Santhakumari, C. R. Subramaniam et al 1965 17 p refs (AEET-207)

A spectrochemical method for the analysis of impurities in platinum and platinum-rhodium alloys is described. The platinum metal or the alloy is converted into the ammonium salt and then mixed with a zinc oxide-graphite buffer in the ratio 2:1. 15 mg of this mixture are burnt to completion in a D.C. arc. The resulting spectra give the concentration of the impurity lines in terms of their spectral intensities. The method can be used in the concentration range of 10–200 ppm of the impurities with a standard deviation of less than ±15%. Rhodium is estimated by a spectrophotometric method after separation from platinum, using anion exchange resins. The accuracy of the rhodium estimation is better than 0.1% at the 5% concentration range. Author

N65-28132# Oak Ridge National Lab., Tenn.
ALPHA—A COMPUTER PROGRAM FOR THE DETERMINATION OF RADIOISOTOPES BY LEAST-SQUARES RESOLUTION OF THE GAMMA-RAY SPECTRA
E. Schonfeld Jul. 1965 47 p refs
(Contract W-7405-ENG-26)
(ORNL-3810) CFSTI: $3.00

A FORTRAN-63 computer program, ALPHA, was developed for the quantitative analysis of radioactive samples by the least-squares resolution of the gamma-ray spectra. As the result of thousands of analyses, ALPHA was found to be fast, accurate, and relatively inexpensive. This report describes

the main features of ALPHA and shows how to use it. The program was designed to handle a small or large number of samples. The samples can have different radioactivity levels (from 0.1 to 10^4 counts/sec), isotope compositions, and input formats. Also, they can be on cards or magnetic tape. ALPHA takes into account several corrections such as: background subtraction, counting time, decay, dead time, automatic compensation for gain and threshold shifts, sample fraction, volume reduction prior to counting, etc. Typical computation times for samples containing from 6 to 10 isotopes are about 5 to 15 sec. The cost per analysis is about 20 cents (this includes only the CDC-1604 computer charges and not the cost of sample preparation and counting). Author

N65-28141# Oak Ridge National Lab., Tenn.
THE EFFECT OF OXYGEN ON THE CORROSION OF NIOBIUM BY LIQUID POTASSIUM
Arnold Powell Litman (M.S. Thesis–Tennessee Univ.) Jul. 1965 121 p refs
(Contract W-7405-ENG-26)
(ORNL-3751) CFSTI: $4.00

The behavior of niobium in liquid potassium at 200°, 600°, and 815° C was influenced by oxygen, temperature, and time. The corrosion manifestations include the production of surface and subsurface corrosion products and the mass transfer of oxygen, niobium, and potassium. Analysis of the surface scales indicated they were predominantly niobium dioxide, but that niobium metal, niobium oxide, and potassium metaniobate were present. Hardness profiles of the specimens as a function of time confirmed that a loss of oxygen from the niobium occurred by solid state diffusion at 600° and 815°C but that no loss occurred at 200° C. Oxygen migrated out of niobium even when niobium dioxide was found in the surface and subsurface scales. Niobium dioxide was found to be unstable in excess potassium. These observations led to the proposal that one or more ternary compounds provide the driving force for system corrosion. These compounds have sufficient thermodynamic stability to reduce the chemical potential of the oxygen in solution below that which exists for equilibrium with binary oxides. R.N.A.

N65-28145# Union Carbide Research Inst., Tarrytown, N. Y.
THE DETERMINATION OF BORON IN REFRACTORY BORIDES BY PYROHYDROLYSIS
G. J. Mc Kinley and H. F. Wendt Jan. 1965 23 p refs
(Contract DA-30-069-ORD-2787)
(TR-C-28; AD-463034)

An analytical method has been developed for the determination of boron in the refractory borides of titanium, zirconium, niobium and tantalum. Pyrohydrolysis of the refractory boride forms boric acid which is distilled, collected, and titrated by a mannitol-sodium hydroxide procedure. The method is precise and accurate, and its simplicity of operation makes it attractive for use as a routine procedure. Author

N65-28157# Louvain Univ. (Belgium). Lab. for Inorganic Chemistry
IONS PRODUCED IN CHEMICALLY REACTING SYSTEMS Final Scientific Report
A. Van Tiggelen, S. De Jaegere, and L. Lowet May 1965 28 p refs
(Contract AF 61(052)-398)
(ARL-65-119; AD-615562)

A method for flash conductimetry in gases is described in this report. Its use in the study of chemi-ionization reactions is briefly discussed. Details are given of the apparatus used in the work reported here. Preliminary results on the conductivity observed during the explosion of a mixture of C_2H_2, O_2 and NO_2 are reported. An analysis of the conductivity-time curves obtained shows that there is a parallelism between rate of ion-formation and radical concentration during the course of the explosion. A temporary conclusion of this work confirms the idea that in one flame several radical reactions may be at the origin of chemi-ionization. Author

N65-28169# Olin Mathieson Chemical Corp., New Haven, Conn. Chemicals Div.
COMPLEXES OF BIS(PHOSPHINO)-o-CARBORANES WITH NICKEL II CHLORIDE
Hampton D. Smith Feb. 1965 8 p refs Submitted for Publication
(Contract Nonr-3395(00))
(TR-25; AD-610618)

The bis-phosphino derivatives were studied for ligand–metal bonding since varying the substituents on the borane portion of the molecule affects the electronic environment of the phosphorous atoms and the stability of the complexes. Reaction of nickel(II) chloride 6-hydrate with bis-diphenylphosphino carborane, and with the corresponding derivatives containing one two, or three bromine atoms attached to the carborane nucleus in methanol and/or ethyl acetate produced complexes containing two molecules of bis-phosphine and one of nickel(II) chloride. No reaction, however, was observed between these ligands and the chloride and nitrate salts of divalent Co, Fe, and Zn, or trivalent Fe and Cr. With copper chloride 4-hydrate, a sluggish ill-defined reaction occurred and the initial product appeared unstable. When Pt(II) and Pd(II) were substituted for Ni(II), stable complexes resulted. Infrared and ultraviolet spectra were obtained, magnetic moments were found at room temperature, and dimagnetic corrections were made for ligands and anions. Molar conductances are also given. M.W.R.

N65-28187# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDYING THE OXIDATION KINETICS AND STRUCTURE OF OXIDES OF CERTAIN HIGH-MELTING METALS
P. M. Arzhanyy, R. M. Volkova, and D. A. Prokoshkin 15 Apr. 1965 13 p refs Transl. into ENGLISH from Issled. po Zharoproch. Splavam, Akad. Nauk SSSR, Inst. Met. (Moscow), v. 9, 1962 p 172–177
(FTD-TT-64-1154/1+2; AD-615220)

An investigation was made of the kinetics of oxidation of niobium and tungsten in basic state and after saturation with silicon and titanium. The phase composition of oxides, formed in the process of oxidation in a wide range of temperatures is discussed. The oxidation mechanism is based on diffusion processes, including the formation of oxides, diffusion of oxygen through the oxide layer into the depth of the metal with change in oxide lattice parameters and in parameters of oxidized metal, and the deceleration or acceleration of rate of oxidation. TAB

N65-28190# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LIQUEFACTION OF NATURAL GAS
Yu. I. Bokserman and R. P. Polyanskiy 29 Apr. 1965 16 p Transl. into ENGLISH from Gaz. Prom. (Moscow), no. 8, 1956 p 19–25
(FTD-TT-64-1271/1+2; AD-615246)

The paper describes a process for obtaining liquefied methane from natural gas and the storage and preservation of liquefied methane. TAB

N65-28191# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MECHANISM OF THE ACTION OF VISCOUS ADDITIVES

Ye. G. Semenido 27 Apr. 1965 9 p refs Transl. into ENGLISH from Neftyanoye Khozyaystvo (USSR), v. 32, no. 3, 1954 p 38–41

(FTD-TT-64-1274/1+2; AD-615247)

The viscosity index v_{50}/v_{100} for evaluating the viscotemperature properties of thickened oils is shown to be useful in the temperature interval range of −30° to 50° C, in addition to its usefulness in the interval from 50° −100° C. Viscotemperature data show that (1) of two oils with identical viscosity at 100° C, the oil with the lower index for v_{50}/v_{100} has the better viscotemperature properties; and (2) of two oils with the same index of v_{50}/v_{100} the oil with less viscosity has the better viscotemperature properties. Thus the thickening action of polymers, the index v_{50}/v_{100} of the oil base, and the viscotemperature properties of thickened oils are interdependent, even in the negative temperature region. The mechanisms of polymers added as viscous additives to oils are also considered, by analyzing how the relationship of the viscosity of oil thickened by polymers (v) to the viscosity of an oil base (v_0) changes with identical temperatures over a broad range. From tabulated data on values of v/v_0 for oils thickened with polyisobutylene, it appears that in mixing oils with polymers, the viscosity level is raised, and the character of the temperature change remains the same, or deteriorates somewhat with increased polymer content. L.S.

N65-28203# Colorado School of Mines Research Foundation, Inc., Golden.

PRODUCTION OF OXYGEN FROM SILICATES IN AN ULTRAHIGH VACUUM

Fred L. Smith 12 Apr. 1965 24 p

(Grant AF-AFOSR-62-426)

(AFOSR-65-0739; AD-615706)

The object was to determine if an ultrahigh vacuum facilitated the decomposition of silicates into oxygen and silicon oxide or silicon. The practical object was to initiate further research on the possibility of using this oxygen as a lunar resource. Tests were run on silicon dioxide, magnesium silicate, and a tektite (an amorphous silicate). All tests indicated that the ultrahigh vacuum significantly lowered the decomposition temperatures of the silicates. In all cases oxygen production was initiated at 1316° C. At 1472° C the production of oxygen was materially accelerated. The mass spectrograph indicated that silicon was produced rather than silicon oxide. In view of the very high pumping speed of the diffusion pump and cryopump on the chamber, it is believed that oxygen production is significant in the 1400° to 1650° C range. TAB

N65-28219# Los Alamos Scientific Lab., N. Mex.

THE X-RAY FLUORESCENCE SPECTROMETRIC DETERMINATION OF CADMIUM IN SILVER-CADMIUM-COPPER ALLOYS

E. A. Hakkila, R. G. Hurley, and G. R. Waterbury 23 Jun. 1965 19 p refs

(Contract W-7405-ENG-36)

(LA-3305) CFSTI: $1.00

Cadmium in silver-cadmium-copper alloys is determined using an x-ray fluorescence method in which 500 mg. of the alloy are irradiated using a tungsten target x-ray tube. The intensity of the Kα line for cadmium corrected for background is compared to corrected intensities measured for solutions of known cadmium content. The method is applicable to the determination of cadmium concentrations of 0.2 to 28% with relative standard deviations in the range from 25 to 0.7%.

Author

N65-28224# Joint Publications Research Service, Washington, D. C.

RESEARCH IN THE FIELD OF PRODUCING MICROCRYSTALLINE MATERIALS WITH A MICACEOUS STRUCTURE

S. G. Tresvyatskiy, M. A. Parkhomenko, and A. D. Kondartenko 13 Jul. 1965 17 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Neorgan. Materialy (Moscow), v. 1, no. 4, Apr. 1965 p 449–459

(JPRS-31056; TT-65-31554) CFSTI: $1.00

This article gives an account of the results of an investigation devoted to the production of a new type of mica crystalline materials from synthetic micas without any kind of binder. As a result of the investigations carried out, a technology for the production of mica crystalline materials was developed and their properties were studied. It was established that mica crystalline materials posses a unique complex of properties which are not observed in other materials. Mica crystalline materials in contradistinction to ordinary ceramic materials can be easily machined, welded by autogenous welding and have a high thermal stability. In comparison to materials on a plastic base, mica crystalline materials have a high heat resistance and retain their mechanical and electrical properties up to 80 to 1000° C. With respect to antifriction properties, mica crystalline materials differ sharply from the usual ceramic materials and approximate cermet antifriction materials as well as graphite-type materials. N.E.A.

N65-28246# Joint Publications Research Service, Washington, D. C.

REACTION OF CERAMIC MATERIALS WITH WATER AND HIGH-PRESSURE STEAM

M. A. Matveyev, R. L. Pevzner, and F. Ya. Kharitonov 13 Jul. 1965 12 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Neorgan. Materialy (USSR), v. 1, no. 4, Apr. 1965 p 625–630

(JPRS-31057; TT-65-31555) CFSTI: $1.00

The regularities of the reaction of ceramic materials—porcelain and steatite—with saturated steam were investigated under isothermal and isobaric conditions over a pressure range from 40 to 100 gauge atmosphere and temperature range from 250 to 310° C. The degree of destruction of the ceramic materials under these conditions increases with a rise in the steam parameters, this steam having an acid nature. Adsorption of the water by the surface of the ceramic followed by hydration and washing out of the alkali and alkaline earth silicates takes place under the studied conditions. In addition to alkali, silica and alumina turn out to be the products of the corrosion destruction. The high losses in weight, formation of porosity and reduction in strength of the investigated materials can be explained by the above indicated phenomena.

Author

N65-28283# Joint Publications Research Service, Washington, D. C.

TRANSLATIONS ON COMMUNIST CHINA'S SCIENCE AND TECHNOLOGY, NO. 194

2 Jul. 1965 38 p refs Transl. into ENGLISH of selected articles from K'o hsueh T'ung pao (Peking), no. 4, 1965 p 362–363

(JPRS-30929; TT-65-31428) CFSTI: $2.00

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3. DIMENSIONAL ANALYSIS OF BINARY FUSED SALT Nien-i Ch'en and Kuang-yun Li p 15–18 refs (See N65-28284 17-34)

4. FUSIBILITY SCALE OF CaF_2-LiCl-NaCl Kuei-ch'eng Chang p 19–20 refs (See N65-28285 17-06)

5. AN EXAMPLE OF COORDINATION BETWEEN BIOLOGICAL RESEARCH AND PRODUCTION PRACTICE Hsing-kuang Kuo p 21–30 ref

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N65-28285 Joint Publications Research Service, Washington, D. C.

FUSIBILITY SCALE OF CaF_2-LiCl-NaCl

Kuei-Ch'eng Chang *In its* Transl. on Communist China's Sci. and Tech. 2 Jul. 1965 p 19–20 refs (See N65-28283 17-06) CFSTI: $2.00

A fusibility scale of the CaF_2-LiCl-NaCl system is made with the method of direct observation of variable temperatures. It is shown that the fusibility scale of the trinary system CaF_2-LiCl-NaCl and those of the trinary systems of CaF_2-LiCl-KCl and CaF_2-NaCl-KCl have similar characteristics. It is shown from a graph that if NaCl or KCl is added to the CaF_2-LiCl system, the solubility of CaF_2 will drop in either case. This is perhaps due to the increase of the positive ion radius of the oxides which causes the static potential of CaF_2 to rise. The solubility of CaF_2 in LiCl-KCl, LiCl-NaCl, and NaCl-KCl systems was calculated and compared with the experimental values of the phase diagram. The results were a positive deflection for all these systems. N.E.A.

N65-28327# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.

PURIFICATION OF ^{244}Cm AND ^{250}Cf FOR RADIATION PROPERTY MEASUREMENTS

Perry Holcomb Apr. 1965 15 p refs

(Contract AT(07-2)-1)

(DP-962) CFSTI: $1.00

Curium-244 was purified by cation exchange chromatography with ammonium α-hydroxyisobutyrate as the elutriant. The ~8 mg of purified ^{244}Cm contained only 0.2 wt % ^{243}Am and 1×10^{-7} wt% ^{250}Cf-^{252}Cf. An additional cycle of cation exchange chromatography with 0.2 mg of the purified ^{244}Cm decreased the ^{243}Am concentration to 9×10^{-4} wt% and the ^{250}Cf-^{252}Cf to $< 1 \times 10^{-9}$ wt%. Alpha and gamma spectral analyses showed the ^{244}Cm to be radiochemically pure. Only low concentrations of nonradioactive impurities were found by emission spectrographic analyses. About 2.4 nanograms of ^{250}Cf-^{252}Cf was purified by cation exchange chromatography, anion exchange, and solvent extraction. The purified ^{250}Cf-^{252}Cf was radiochemically free of plutonium, americium, and curium. An undetermined amount of ^{249}Bk was probably present, but it contributed insignificant alpha, gamma, and neutron radiations. No gamma-emitting impurities were detected by gamma spectral analysis. Author

N65-28345*# Vermont Univ., Burlington.

CHANGES IN THE RESISTANCE OF MOLYBDENUM FILMS DUE TO THE CHEMISORPTION OF CARBON MONOXIDE

Theodore H. Ansbacher (M.S. Thesis), Mar. 1965 48 p refs

(Grants NsG-241; NsG(T)-28)

(NASA-CR-63793) CFSTI: HC $2.00/MF $0.50 CSCL 07D

Molybdenum films were produced and the phenomenon of adsorption was investigated through the study of resistance changes in these films as CO_2 was fed into the system at various pressures. The thickness of the films in all cases was estimated to be 200 to 500 Å. The increase in resistance was approximately 4.5%. This is of the same order of magnitude as that observed previously with CO_2 on nickel films. Resistance was measured at 100° C and −78° C. The temperature coefficient of resistance of the films was calculated as

$$\alpha = \frac{2}{R_1 + R_2} \quad \frac{R_2 - R_1}{T_2 - T_1}$$

where R_1 is the total resistance at T_1, and R_2 is the total resistance at T_2. The temperature coefficients of resistance of the Mo films was 2.1 to 2.5×10^{-4}. E.E.B.

N65-28368# Western Reserve Univ., Cleveland, Ohio. Electrochemistry Research Lab.

THE ELECTROCHEMISTRY OF OXYGEN ON NICKEL OXIDE

Akiya Kozawa and Ernest Yeager 1 Nov. 1964 57 p refs

(Contract Nonr-1439(09))

(TR-1; AD-615495)

The electrochemistry of oxygen has been examined on both pure and lithiated nickel oxide prepared by the oxidation of nickel at elevated temperatures. The rest potentials of such electrodes in alkaline solutions containing oxygen and peroxide have been found to be very close to those expected on the basis of the standard electrode potential for the oxygen-hydrogen peroxide couple and follow the Nernst dependence on peroxide concentration expected for this couple. Cathodic coulombic efficiency measurements indicate that the majority of the current is derived from the reduction of oxygen to the peroxide. Voltammetry studies indicate that oxygen reduction to peroxide and the reverse process can be relatively easily accomplished on nickel oxide, particularly the lithiated nickel oxide, but that the further two-electron reduction of peroxide to water and hydroxide ions is extremely irreversible. The dissolution rates for NiO also have been examined in various solutions and found to be very low even in acid solutions at somewhat elevated temperatures. Author

N65-28394 European Organization for Nuclear Research, Geneva (Switzerland).

APPLICATION OF SYNTHETIC POLYMERS IN PREPARATION OF FINE-GRAIN NUCLEAR EMULSIONS

N. P. Novikova, V. I. Zakharov and E. V. Fadina *In its* Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 26 p refs (See N65-28375 17-24)

Polyvinylacetals were used for partial substitution for gelatine in fine-grain nuclear emulsions, to study the photographic properties of the emulsions. The experimental results showed that the tensile strengths of gelatine and polymer-gelatine layers are similar, but the elasticity of the polymer-gelatine layers is nearly twice that of the gelatine layers, which means that the use of polyvinylacetal is preferable to gelatine alone when the photographic layer is to be exposed to vacuum. Also investigated are the optimal conditions for coagulation of fine-grain nuclear emulsions, for washing and sediment peptizing, and finally the possibility of creating a system which will be colloid-stable after peptizing at any pH value. J.M.D.

N65-28485# Polish Academy of Sciences, Warsaw. Inst. of Nuclear Research.

LABORATORY CONTROL METHODS OF RADIOACTIVE CONTAMINATION IN WATERS

A. Kostyrko, I. Olszewska, and K. Zarnowiecki Nov. 1964 23 p refs

(Rept.-568(XIX))

The investigations of three most typical for Poland methods of preparing the measurement preparations from aqueous

solutions aimed at evaluation of radioactivity losses caused by different chemical operations. These methods consist in evaporating of solutions in beakers and/or evaporations dishes and subsequent: (1) erasing of the precipitate from evaporation dishes, or (b) wiping out of the precipitate from evaporation dishes with wet filter paper and subsequent baking at elevated temperatures. The results show that generally most advantageous is the first of described methods, provided that adequate precautionary measures are preserved. Author

N65-28494# France. Ministère de l'Air, Paris.
PHOTOCHEMICALLY SENSITIZED ADDITION OF ALCOHOLS TO COMPOUNDS NOT SATURATED WITH CONJUGATE CARBONYLE [ADDITION PHOTOCHIMIQUE SENSIBILISEE DES ALCOOLS AUX COMPOSES NON SATURES A CARBONYLE CONJUGUE]
Michel Pfau Ser. de Doc. Sci. et Tech. de L'Armement, 1965 109 p refs In FRENCH
(NT-143)

Photochemical addition, sensitized by benzophenone, of isopropanol and other alcohols to alpha beta-ethylenes and alpha beta-acetylenes as well as to alpha beta-ethylenic ketones. Obtainment of gamma-lactones and of beta-alkylized alpha beta-ethylene ketones with citraconic acids, of methacrylic, crotonic, propiolic, dicarboxylic acetylene, and of cyclopentenone, isophorone, are presented. A study of the mechanism, examination of the newly isolated compounds, and 125 bibliographic references are given. Trans. by J.G.

N65-28510# European Atomic Energy Community, Brussels (Belgium).
DETERMINATION OF Al, Al_2O_3, Fe, Si, Zn, C IN SAP POWDERS COMPARISON BETWEEN LABORATORIES [DOSAGE DE Al, Al_2O_3, Fe, Si, Zn, C DANS LES POUDRES DE SAP COMPARAISON ENTRE LABORATOIRES]
J. L. Collin and A. Hubaux 1965 29 p refs In FRENCH; ENGLISH summary
(EUR-2286.f) Available from Belg. Am. Bank and Trust Co., New York, Account No. 22.186: 40 Belg. Fr.

This report describes a comparative statistical study concerning the determination of Al, Al_2O_3, Fe, Si, Zn and total Carbon in SAP powders. The results are given in tables and graphics. A short description on the statistical calculations is also given. Author

N65-28588# Iowa State Univ. of Science and Technology, Ames. Ames Lab.
STABILITY CONSTANTS OF SOME LANTHANIDE-ALIPHATIC α-HYDROXYCARBOXYLATES
David Fleischer and Jack E. Powell Feb. 1965 118 p refs
(Contract W-7405-ENG-82)
(IS-1121) CFSTI: $4.00

The stability constants of the trivalent rare earth ions with the ethylglycolate, ethylmethylglycolate, and diethylglycolate ligands were determined at 25° C and an ionic strength of 0.1, using sodium perchlorate as a supporting electrolyte. Factors determining the stability of the chelates were discussed. Author

N65-28589# Iowa State Univ. of Science and Technology, Ames. Ames Lab.
ANION EXCHANGE SEPARATIONS OF THE RARE EARTHS IN NONAQUEOUS SOLVENTS
Richard G. Greene and James S. Fritz Feb. 1965 87 p refs
(Contract W-7405-ENG-82)
(IS-1153) CFSTI: $3.00

Many metal ions were separated from the rare earth elements using a nitrate-form anion-exchange column. This was accomplished by eluting the various metals from the more highly sorbable rare earths with 1.5M nitric acid in 85% isopropyl alcohol. The higher rare earths can be eluted from the column using lower percentages of isopropyl alcohol and separated from bismuth (III), lead (II), and thorium (IV), which remain on the column. A study was made of the conditions necessary to separate various rare earths from each other using anion-exchange techniques. Invasion of anion-exchange resin by lithium nitrate and nitric acid from organic-water solvent is an important factor in determining the extent of invasion. Mean ligand numbers for various metal ions with the nitrate ligand were determined in water-organic solvent mixtures using ion-exchange techniques. The mean ligand numbers were determined in the anion-exchange resin phase as well as in the solution phase. The ligand numbers were found to increase in going from the solution to the resin phase. Author

N65-28592# Dow Chemical Co., Denver, Colo. Rocky Flats Div.
GROWTH OF ALPHA PLUTONIUM CRYSTALS FROM MELTS UNDER EXTREME PRESSURE
Roland B. Fischer [1964] 21 p refs
(Contract AT(29-1)-1106)
(RFP-421) CFSTI: $0.50

Large-grained alpha plutonium has been prepared by slow solidification of melts under pressure of about 60 kbars. The technique opens the way to produce single crystals of alpha plutonium, and to obtain basic information previously unattainable. Author

N65-28595# Bureau of Mines, Bartlesville, Okla. Bartlesville Petroleum Research Center.
INFRARED SPECTRA OF 27 COMPOUNDS IN THE REGIONS 15–35 AND 15–200 MICRONS
G. A. Crowder and D. W. Scott 1965 41 p ref
(Contract CSO-59-9; ARPA Order 416)
(BM-RI-6630)

Far infrared spectra, most of them in the region 15-200 microns and for both the liquid or solution state and for the vapor state, were obtained for twenty-seven compounds. Author

N65-28670# Hanford Atomic Products Operation, Richland, Wash.
LABORATORY STUDIES ON THE USE OF URANIUM (IV) AS A PLUTONIUM REDUCTANT IN A PUREX PROCESS
J. E. Mendel Jun. 1965 15 p refs
(Contract AT(45-1)-1350)
(HW-82103) CFSTI: $1.00

A flowsheet was proposed for a plant production test of uranium (IV)–hydrazine instead of ferrous sulfamate–sulfamic acid as a plutonium reductant in the Purex solvent extraction separation process for irradiated nuclear fuels. The study indicates that satisfactory operation of the 1B column can be

obtained with the proposed flowsheet. Uranium(IV) was shown to be adequately stable in the Purex solvent to allow reasonable hold-up time in the vessel in which the feed stream is made up. Plutonium reduction was sufficiently rapid and complete under 1BX extraction conditions to assure adequate separation of plutonium from the product uranium stream. Although some re-oxidation and re-extraction of plutonium in the 1BS column was expected, the results indicate that the plutonium reflux is no greater than that which occurs with the present flowsheet. Uranium(IV) extraction in the 1BS column is enough to insure acceptably low uranium in the product plutonium stream, particularly if high acidity is maintained through addition of the 1BXP-HNO_3 stream. R.N.A.

N65-28786# United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
REPROCESSING WITH AMINE–ETHER SYSTEMS. PART I: CHOICE OF SOLVENT SYSTEM
E. S. Lane, A. Pilbeam, and J. M. Fletcher Apr. 1965 22 p refs
(AERE-R-4440, Pt. 1) HMSO: 3s 6d

The tertiary amine, Alamine 336, and the ether diluent, dibutyl cellosolve, $C_4H_9{\cdot}O{\cdot}C_2H_4{\cdot}O{\cdot}C_4H_9$, have been selected for further study with an outline flowsheet by which plutonium would be separated from the uranium and fission products contained in an irradiated fast reactor fuel. Some properties of the organic phases produced after equilibration with aqueous nitric acid, have been determined for the amine and ether separately, and also as a 15% v/v mixture of the amine in the ether. The properties examined have included (i) degradation by heat and irradiation and (ii) third phase formation. Author

N65-28787# United Kingdom Atomic Energy Authority, Wantage (England). Isotope Research Div.
THE RADIOLYTIC OXIDATION OF METHANE. PART 2: THE FORMATION OF HYDROCARBONS, ALCOHOLS, ESTERS, ETHERS AND OTHER MINOR PRODUCTS
J. A. Hearne and R. W. Hummel Nov. 1964 43 p refs
(AERE-R-4871) HMSO: 6s

The yields of methanol, ethanol, ethylene, acetaldehyde, methyl formate, and minor products from the 4 MeV electron and ^{60}Co γ radiolysis of 10% O_2–CH_4 mixture at 25° C, have been studied over pressure and dose rate ranges of 1–76 cm Hg and 2.43×10^{14}–5.38×10^{17} eV ml^{-1} min^{-1} normalized to 20° C and 76 cm Hg. A reaction scheme is proposed on the basis of this work and published data. Author

N65-28799# Rocket Power, Inc., Pasadena, Calif. Research Labs.
RESEARCH ON SUBSTITUTED FLUOROCARBONS Final Summary Report, 1 Nov. 1963–30 Apr. 1965
Laurence B. Marantz and Russell Reed, Jr. [1965] 14 p refs
(Contract Nonr-3597(00))
(AD-465146)

A new synthesis of trifluoromethylhypofluorite (CF_3OF) has been investigated. The preparation of this compound was accomplished by spark-initiated reactions between trifluoromethane and oxygen difluoride. When small amounts of nitrogen are present in explosive reactions of methane and oxygen difluoride, fluorine nitrate is produced. When oxygen difluoride is mixed with nitric oxide, equimolar mixtures of nitryl fluoride and nitrosyl fluoride are produced. A mechanism for this reaction is proposed. Author

N65-28811# Bureau of Mines, Albany, Oreg. Albany Metallurgy Research Center.
A STUDY OF THE CHLORINATION KINETICS OF GERMANIUM, SILICON, IRON, TUNGSTEN, MOLYBDENUM, COLUMBIUM, AND TANTALUM
Arne Landsberg and Frank E. Block 1965 30 p refs
(BM-RI-6649)

A study of the chlorination kinetics of germanium, silicon, iron, tungsten, molybdenum, columbium, and tantalum has been made to determine the effects of temperature, chlorine concentration, geometric surface area and gamma radiation. The reaction products were volatile at the temperatures used thus making it possible to follow the reaction rates by weight loss of the solid. Chlorination rates of germanium, silicon, and iron were found to be directly proportional to chlorine concentration while the rates for tungsten, molybdenum, columbium, and tantalum were proportional to the 0.5 to 0.6 power of chlorine concentration. A good correlation of reaction rate and geometric surface areas was not obtained because the true surface area of the samples could not be measured. Intense gamma radiation had no effect on reaction rates. The Arrhenius activation energies determined over the temperatures used are as follows: Germanium, 27 kcal/mole (233°–241° C); silicon, 33 kcal/mole (375°–517° C); iron, cold rolled, 20 kcal/mole (259°–325° C) annealed, 21 kcal/mole (293°–337° C); tungsten, 43 kcal/mole (617°–776° C); molybdenum, 37 kcal/mole (445°–491° C); columbium, 34 kcal/mole (229°–225° C); and tantalum, 29 kcal/mole (370°–449° C). Mechanisms are proposed for the germanium, silicon, and iron chlorinations. Self heating of the solids and diffusion control in the gas phase were noted at higher reaction rates. Author

N65-28820# Atomics International, Canoga Park, Calif.
ELECTROLYSIS OF URANIUM CARBIDE IN FUSED SALT USING MOLTEN METAL CATHODES
M. L. Iverson and R. J. Sullivan 30 Jun. 1965 25 p refs
(Contract AT(11-1)-GEN-8)
(NAA-SR-10737) CFSTI: $2.00

Uranium carbide was anodized in fused LiCl–KCl eutectic containing UCl_3 to give deposits of uranium and uranium intermetallic compounds in liquid metal cathodes. The cathode current efficiencies found for the metal cathodes, lead, zinc, bismuth, and cadmium, decreased in the order given and ranged from 0.1 to 91%. The anode efficiencies varied in approximately the same manner and ranged from 1 to 93%. Under similar conditions, uranium anodes gave higher yields and this difference was attributed to a greater loss of current through U^{+3}/U^{+4} cycling with uranium carbide anodes. The current efficiency decreased markedly with the increase in UCl_3 beyond an optimum concentration. This decrease in yield was attributed to a greater current loss through U^{+3}/U^{+4} cycling at higher UCl_3 concentrations. Author

N65-28821# United Kingdom Atomic Energy Authority, Harwell (England.) Chemistry Div.
THE DETERMINATION OF LEAD 210 AND POLONIUM 210 IN AIR FILTERS
G. S. Spicer Feb. 1965 13 p
(AERE-AM-102) HMSO: 2s 6d

A method for determining Pb^{210} and Po^{210} in air filters is described. The filter material is wet oxidized by nitric and sulfuric acids in the presence of lead and bismuth carriers and Po^{208} tracer. The oxidation is completed by perchloric acid in the presence of sulfuric acid. The residue is transferred to platinum, and hydrofluoric acid is added to attack siliceous matter on which the Po^{210} is strongly adsorbed. The fluoride is removed by evaporation and the residue dissolved in ammonium citrate. The lead, bismuth, and polonium are precipitated by thioacetamide and the sulfides decomposed with nitric acid. Fuming nitric acid is added to precipitate the lead as nitrate. The bismuth and polonium remain in the supernate

which is evaporated to low volume and the polonium is co-precipitated on bismuth oxychloride. The precipitate is dissolved in dilute hydrochloric acid and transferred to a plating bath containing a silver disc. The polonium is deposited by electrochemical replacement of the silver and the source thus prepared is alpha counted in conjunction with a pulse-height analyzer to determine the amount of Po^{210} by comparison with the Po^{208} tracer added. Lead is purified by extraction as dithizonate into chloroform and back extracted into nitric acid. It is precipitated and mounted as sulfate for beta counting after the Bi^{210} isomer has grown into equilibrium with the Pb^{210} R.N.A.

N65-28822# United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
THE DETERMINATION OF ZIRCONIUM-95 IN GRAPHITE FROM H.T.G.C. LOOPS. AN ANION EXCHANGE SEPARATION OF ZIRCONIUM-95 FROM SCANDIUM-46 AND IRON-59
J. W. Arden and J. W. Mc Millan Mar. 1965 11 p refs
(AERE-R-4872) HMSO: 1s 9d

The A.E.R.E. versions of the barium fluozirconate and di-(2-ethyl hexyl) phosphoric acid extraction methods for zirconium-95 are unsatisfactory for the determination of this nuclide in graphite from High Temperature Gas Cooled Loops. Both methods suffer interference from scandium-46, and the former does so additionally from iron-59. A suitable procedure was devised for these samples by combining the barium fluozirconate procedure with an anion exchange separation of zirconium-95 from scandium-46 and iron-59. Author

N65-28823# United Kingdom Atomic Energy Authority, Harwell (England).
THE DECOMPOSITION OF HYDROUS TITANIUM OXIDE IN HIGH-TEMPERATURE WATER
K. C. Barnes and J. C. Waldron Apr. 1965 12 p
(AERE-R-4894) HMSO: 2s 6d

Tests have been made on hydrous titanium oxide in water at various temperatures. The ammonium form lost almost all its exchange capacity after heating for three hours at 300° C. The potassium form lost 80% of its capacity during one three-hour heating at 300° C and most of the remainder on further treatment. At 200° C, the reaction was slower but equally complete after longer exposure. Only very slight decomposition was observed at 100° C. The exchange ion, K^+ or $(NH_4)^+$, was liberated as free alkali. Author

N65-28832# United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
REPROCESSING WITH AMINE–ETHER SYSTEMS. PART II: DISTRIBUTION COEFFICIENTS
I. L. Jenkins, H. A. C. Mc Kay, C. G. C. Shorthill, and A. G. Wain May 1965 17 p refs
(AERE-R-4440, Pt. II) HMSO: 2s 6d

Results have been obtained for the extraction of uranium, plutonium, nitric acid and fission products into tertiary amines in ether diluents, and for the backwashing of plutonium from the organic phase. Most of the work has been with a solution of Alamine 336 in dibutyl cellosolve (DBC). The results show that the preferential extraction of plutonium from a mixture of plutonium, uranium and fission products is feasible, and that acetic acid-nitric acid mixtures can be used for backwashing. Author

N65-28838# Mellon Inst., Pittsburgh, Pa.
NUCLEAR MAGNETIC RESONANCE Final Scientific Report
A. A. Bothner-By 15 Mar. 1965 6 p refs
(Contract AF 49(638)-980; Grant AF-AFOSR-199-63)
(AFOSR-65-0579; AD-615438)

A chronological bibliography is given of publications on nuclear magnetic resonance having appeared or anticipated. Research is summarized on the use of nuclear magnetic resonance spectra in chemical analysis. Work on spin-spin coupling constants, conformal studies, and magnetic anisotropy is summarized. Author

N65-28844# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
POLYMERS WITH CONJUGATED BONDS AND HETERO-ATOMS IN A CONJUGATED CHAIN
A. A. Berlin and T. V. Kostroma 26 Apr. 1965 13 p refs
Transl. into ENGLISH from Geterotsepnye Vysokomolekularnye Soyedineniya, Sb. Statey (USSR), 1963 p 53-58
(FTD-TT-64-1261/1+2; AD-615243)

Salicyl derivatives of ferrocene were obtained that were never described before. Polymer chelate complexes were obtained for tetrasalicylates of ferrocene with copper, beryllium, bi- and tetravalent iron, aluminum and magnesium, and complex compounds and disalicyl ferrocene with silver and copper. The thermal stability of the complexes obtained was determined and it was shown that the greatest resistance to heat is possessed by complexes with beryllium, as well as with Mg and Al, which stand heating up to 200C without significant loss in weight. The least thermal stability was observed in the case of complexes with copper, which at 200C in the course of 5 minutes, lose 30% of their weight. It was established that the complexes of salicylates of ferrocene, in contrast to the corresponding monomer products, possess considerably higher magnetic susceptibility and higher electrical conductivity. Author

N65-28854*# Wisconsin Univ., Madison. Theoretical Chemistry Inst.
GENERALIZED KEESOM POTENTIAL
Bruno Linder (Florida State Univ.) 26 Apr. 1965 29 p refs
(Grant NsG-275-62)
(NASA-CR-63847; WIS-TCI-89) CFSTI: HC $2.00/MF $0.50
CSCL 07D

A field theoretic approach is used to derive general expressions for the adiabatic interaction between two rotating dipolar systems, whose temperatures may differ. The results, which are expressed in terms of the dipole moments, moments of inertia and temperatures of the two systems are valid, in second order approximation, over the whole range of temperatures including the region where quantum effects are important. The classical limit reduces to the Keesom potential for equal temperatures. When the temperatures are different the classical potential can take on positive (repulsive) values as well as negative (attractive) values, depending on the temperature difference and ratio of temperature to moment of inertia of the two systems; for large temperature differences the potential is always repulsive. The general equations are analyzed and the quantum-statistical implications underlying the theory are discussed. Author

N65-28881# United Kingdom Atomic Energy Authority, Harwell (England). Research Group.
THE ANALYSIS OF URANIUM PHOSPHIDES
G. W. C. Milner, D. H. Rowe, and G. Philips Apr. 1965 19 p refs
(AERE-R-4906) HMSO: 3s

Methods are described for the chemical analysis of uranium monophosphide (UP) and a higher phosphide (U_3P_4) produced as an intermediate in the preparation of the monophosphide. Sintering with a 3:1 mixture of sodium peroxide and sodium carbonate in a nickel crucible at 350° C for 1 hour is employed to dissolve samples for the determination of the phosphorus content. After extracting the sinter with water and adjusting to between 0.5 and 0.8 M in HNO_3, the solution is passed through a column of cation exchanger (Zeocarb 225) to remove uranium. The phosphorus content is then determined by precipitation as ammonium phosphomolybdate, followed by filtration, drying at 280° C and weighing. A slight correction is necessary to allow for a negative bias of 0.1% in the method. The precision of a determination is <0.2% (coefficient of variation). For the determination of uranium, a separate sample is taken and dissolved in HNO_3 + HCl. After adjusting to pH 4.5, the uranium is precipitated as uranyl ammonium phosphate by adding ammonium hydrogen phosphate and boiling. The precipitate is filtered, ignited to uranyl pyrophosphate, and weighed. Results are quantitative for this determination with a coefficient of variation of 0.24%. Author

N65-28882# United Kingdom Atomic Energy Authority, Wantage (England). Research Group.

DISPENSING SOLUTIONS FOR LIQUID SCINTILLATION COUNTING

Horace E. Dobbs Apr. 1965 9 p refs

(AERE-M-1574) HMSO: 1s 9d

Data are presented which show that for dispensing liquids the injection method offers a considerable increase in accuracy over delivery from a pipette, the greatest deviation from the mean being ±0.7% for the former and +4.0% to −6.8% for the latter method. The comparison was made between a sample injected into a sealed counting phial from a clinical syringe and by dispensing the sample from a pipette into an open phial. An incidental factor is also offered when the phials are sealed with serum caps. The use of a serum cap permits counting phials to be constructed from boro silicate glass tubing with a low K-40 content. In such a system in which all pulses were greater than 5 V, the background fell from 117 counts/minute to 79 counts/minute when the background solution was transferred from a soda glass phial to one made from Pyrex tubing. Also, if hexadecane is used as a routine spike for measuring the counting efficiency of liquid scintillation solutions, it can be stored conveniently in such an Agla syringe. E.E.B.

N65-28886# United Kingdom Atomic Energy Authority, Windscale (England).

ANALYTICAL METHOD FOR THE DETERMINATION OF TITANIUM IN PLUTONIUM NITRATE CONCENTRATE (TRI-N-OCTYL PHOSPHINE OXIDE EXTRACTION OF TITANIUM THIOCYANATE)

[1965] 5 p refs

(PG-649(W))

Plutonium nitrate concentrate is fumed with concentrated sulphuric acid to remove nitrate ion. The precipitate of plutonium sulphate is dissolved and the solution made 6M with respect to sulphuric acid. Thioglycollic acid is added, to prevent interference from molybdenum (VI), followed by ammonium thiocyanate, and titanium as the yellow thiocyanate complex is extracted into 0-005M tri-n-octyl phosphine oxide in cyclohexane. The absorbancy of the complex is measured with a Spekker absorptiometer. Author

N65-28887# United Kingdom Atomic Energy Authority, Windscale (England).

ANALYTICAL METHOD FOR THE ABSORPTIOMETRIC DETERMINATION OF COPPER IN PLUTONIUM SOLUTIONS (2,2' DIQUINOLYL METHOD)

May 1965 6 p

(PG-651(W)) HMSO: 1s 2d

Copper is determined absorptiometrically as the cuprous 2,2' diquinolyl complex after extraction by amyl alcohol. The plutonium solution is made of acid and a mixed sodium acetate–hydroxylamine hydrochloride solution is added. This maintains the pH between 5 and 6 and reduces any cupric ions present to the cuprous state. A solution of 2,2' diquinolyl in amyl alcohol is added and the cuprous complex is extracted into the solvent phase. The absorbancy is measured with a Spekker absorptiometer, using Ilford 604 filters. E.E.B.

N65-28888# United Kingdom Atomic Energy Authority, Warrington (England). Reactor Group.

ANALYTICAL METHOD FOR THE DETERMINATION OF 137-CAESIUM IN FISSION PRODUCT SOLUTIONS USING A CARRIER-FREE EXTRACTION PROCEDURE

W. Davies and W. R. Diggle 28 Apr. 1965 9 p

(TRG-962(D)) HMSO: 1s 6d

The 137-caesium in extracted into anyl acetate as caesium tetraphenylborate from an alkaline aqueous solution containing ethylenediamine tetraacetate. No inactive caesium is added. The amount of 137-caesium extracted is determined by a gamma counting procedure applicable to liquid sources. Interference from radio-ruthenium is reduced by warming the alkaline solution and the cooling to room temperature prior to the extraction. Accuracy: Bias is dependent on the 137-caesium radiometric standard which is calibrated to an accuracy of ±2%. Coefficient of Variation: 2% to 3% when applied to 1×10^6 d.p.m. of pure 137-caesium tracer solution. Concentration Range: 1×10^5 to 2×10^6 d.p.m. of 137-caesium per aliquot. Applicable to nitric, hydrochloric or sulphuric acid solutions of irradiated plutonium and uranium prepared for the determination of "burn-up" after a cooling time of at least three months. Potassium must be absent. The 134-caesium activity must be 2% to 50% of the caesium activity in order to make a correction for it. Author

N65-28889# United Kingdom Atomic Energy Authority, Warrington (England). The Reactor Group.

ANALYTICAL METHOD FOR THE THERMOGRAVIMETRIC DETERMINATION OF THE OXYGEN/METAL RATIO OF URANIUM–PLUTONIUM OXIDES

J. L. Drummond and H. Chapman 28 Apr. 1965 5 p

(TRG-963(D)) HMSO: 10d

The oxide, after oxidation in air at 1000° C, is reduced in hydrogen at 1200° C to the stoichiometric oxide. The difference in weight between the initial and reduced weights is related to the oxygen/metal ratio of the sample. Accuracy: The bias on the oxygen/metal ratio is less than 0.01. Precision: The standard deviation on the oxygen/metal ratio is less than 0.004. Concentration Range: Oxygen/metal ratios from 1.8 to 2.3 for any ratio of plutonium to uranium. Applicable to uranium oxide, plutonium oxide and mixed plutonium/uranium oxides; either as powders or sintered granules or pellets. Author

N65-28899# Rocky Flats Div., Don Chemical Co., Golden, Colo.

DISSOLUTION OF REFRACTORY PLUTONIUM DIOXIDE

J. M. Cleveland [1964] 6 p Also published in J. Inor. Nucl. Chem., v. 26, 1964 p 1470-1471

(Contract AT(29-1)-1106)

(RFP-352)

After comparative testing with various acids, hydrobromic acid was selected as a possible solvent for the dissolution of refractory plutonium dioxide. A procedure is given for dissolving a large quantity of oxide residue remaining after extended refluxing of plutonium casting skulls in nitric−0.25 molar hydrofluoric acid. A yield of greater than 99.98% was obtained using hydrobromic acid. M.R.W.

N65-28903# United Kingdom Atomic Energy Authority. Harwell (England). Library.

NEW METHODS FOR OBTAINING FRESH WATER FROM SEA WATER BY FREEZING

T. Messing Dec. 1964 12 p refs Transl. into ENGLISH from Dechema Monograph. (Frankfurt am Main), v. 47, nos. 805–834, 1962 p 793–804

(AERE-TRANS-1022) HMSO: 2s 6d

Description of a process in which sea water is evaporated under vacuum at a temperature of −2°C, resulting in the formation of salt-free ice crystals. The corresponding vapours are condensed in direct contact with a suitable absorbent, and the heat of condensation is subsequently exploited for melting the ice. The supplementary heat introduced into the process, either from ambiancy or by absorption, is eliminated in a suitable refrigerator. The water taken up by the absorbent is drawn off in a multiple-effect evaporating plant, thus regenerating the condenser liquid. It can be expected that a considerable decrease in drinking water production cost, aimed at for a long time but never achieved before in an industrial plant, will be realized by this combination of freezing cum multiple-effect evaporation. Author

N65-28905# United Kingdom Atomic Energy Authority. Harwell (England). Chemistry Div.

METHODS OF DECREASING THE EXTRACTION BY PROCESSING SOLVENTS OF NITROSYLRUTHENIUM NITRATO-COMPLEXES FROM NITRIC ACID SOLUTIONS. PART 2: TREATMENT OF AQUEOUS SOLUTIONS WITH NITROUS ACID

D. Scargill and C. E. Lyon Mar. 1965 24 p refs

(AERE-R-4769) HMSO: 3s 6d

Studies have been made on (i) the preparation of nitrous acid, and (ii) the rates of formation and decomposition of nitrosylruthenium nitro complexes in nitric acid solutions. A suitable method for the treatment of nitrosylruthenium nitrato complexes with nitrous acid to give a yield of about 90% nitro complexes is given. Author

N65-28909# National Canners Association, Washington, D. C. Research Foundation.

APPLICATION OF RADIOCHEMISTRY TECHNIQUES IN FOOD PROCESSING RESEARCH. RADIOISOTOPIC TRACER TECHNIQUES IN EVALUATION AND IMPROVEMENT OF INDUSTRY PRACTICES FOR REMOVAL OF PESTICIDE RESIDUES FROM FOODS Annual Report No. 4

Walter A. Mercer, ed. Washington, AEC, 30 Nov. 1964 44 p refs

(Contract AT(04-3)-536)

(SAN-536-10) CFSTI: $2.00

A standard soil was treated with a commercial DDT formulation enriched with random ring-labeled DDT-C^{14}. Autoradiography of soil samples showed a uniform pesticide distribution. Soil core sample analyses indicated a slow downward migration of the pesticide. Autoradiography of 36 day old Chantenay carrots grown in DDT-C^{14}-treated soil showed a faint image in the root system. Evidence was obtained for a root-to-foliage and for a foliage-to-root migration of radioactivity. Carrots grown in soil treated with nonradioactive DDT had radioactivity in the root system. Foliage, sprayed with cold DDT on carrots grown in DDT-C^{14}-treated soil contained radioactivity. In the harvested carrot crop grown in treated soil, 68% of the radioactivity was found in the rootlets, tap root end, and skin. These portions, removed by food preparation operations, represent less than 7% of the carrot weight. The DDT level in the prepared carrot was less than 0.05 ppm. A method of separation and identification of chlorinated pesticides was developed. New methods for the clean-up and thin-layer chromatography of thiophosphate pesticides are described. R.N.A.

N65-28939# Rocky Flats Div., Dow Chemical Co., Golden, Colo.

THE RESOLUTION OF MIXTURES OF CARBON DIOXIDE AND NITROUS OXIDE BY GAS SOLID CHROMATOGRAPHY

R. P. De Grazio 8 Jul. 1964 10 p refs

(Contract AT(29-1)-1106)

A simple and unique chromatographic method is presented for the resolution of gaseous mixtures of carbon dioxide and nitrous oxide. A two-column system is employed; a small pre-column insert of molecular sieve 13X is coupled to the main chromatographic column. The difference in the retention times of CO_2 and N_2O through the molecular sieve pre-column will permit resolution while the remainder of the column is available for other chromatographic separations. Molecular sieve pre-column lengths of 4, 6, and 8 inches coupled to a 6 ft by 1/4-inch column, packed with silica gel, gave adequate resolution for the separation of CO_2 and N_2O. A 4-inch pre-column was found to be the minimal length capable of accomplishing adequate resolution of mixtures of equal concentration. E.E.B.

N65-28959*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field.

A CRITICAL STUDY OF THE ABSORPTION OF POLYPEPTIDES IN THE FAR-ULTRAVIOLET AS A MEANS OF EXTRATERRESTRIAL LIFE DETECTION

Richard D. Johnson Washington, NASA, Jul. 1965 11 p refs

(NASA-TM-X-1131) CFSTI: HC $1.00/MF $0.50 CSCL 07C

It recently has been proposed and concluded feasible that the far-ultraviolet spectrum of polypeptides can be successfully used in a life detection device. A critical review of that work shows there can be serious errors in both the position and intensity of the absorption maxima in this spectral region under the conditions proposed. Results of critical experiments are presented to clearly illustrate these errors and show them to be attributable to stray light. In addition, a survey of materials other than polypeptides which also absorb in the same spectral region indicates that interference from nonpeptides can be substantial. This interference coupled with stray light errors precludes confidence in far-ultraviolet absorption as an approach to extraterrestrial life detection. Author

N65-28962# California Univ., Livermore. Lawrence Radiation Lab.

A LOW-DENSITY, LOW-PRESSURE SOLID EXPLOSIVE

Paul B. Archibald 25 May 1965 8 p refs

(Contract W-7405-ENG-48)

(UCRL-14186)

A new detonable system based on low concentrations of crystalline PETN deposited in a porous low-density substrate has been demonstrated. Stable detonation waves propagating in 3/4-inch-diameter rate sticks at 1.5 mm/μsec were measured. The detonation velocity can be varied by changing the PETN concentration. At a concentration of 0.09 g of PETN per cc, a detonation velocity of 2.05 mm/μsec was measured. Under these conditions, calculations indicate a CJ pressure of 3 kilobars and a gamma of 1.7. Author

N65-28972# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

NUCLEAR RESONANCE SPECTROSCOPY OF ELASTOMER SOLUTIONS

N. M. Sergeyev and V. L. Karpov 30 Apr. 1965 9 p refs (FTD-TT-64-1333/1+2; AD-615258)

Nuclear magnetic resonance spectra at 25 Mc/s of the elastomers polyisobutylene, polybutadiene (SKB), divinyl rubber and natural rubber were obtained for their solutions in CC14 and partly in benzene. For polyisobutylene solutions, a study of the dependence of the CH3 peak width upon the concentration of the solution showed that the width tends to a limiting value of ca. 5 c/s at infinite dilution, the value apparently not being connected with the reduced viscosity. The chemical shifts of the characteristic groups of the polymers are given. A chemical shift for the protons was found directly in block polybutadiene SKB. A method for determining the composition of polybutadiene by means of NMR spectra is proposed. Author

N65-28973# Bureau of Mines, Bartlesville, Okla. Petroleum Research Center.

THE THERMOCHEMISTRY OF BORON AND SOME OF ITS COMPOUNDS. THE ENTHALPIES OF FORMATION OF ORTHOBORIC ACID, TRIMETHYLAMINEBORANE, AND DIAMMONIUM DECABORANE

W. D. Good and M. Mansson May 1965 27 p refs (ARPA Order 416)

A rotating-bomb calorimetric technique was developed to determine accurate enthalpy of combustion values for boron and boron compounds. The enthalpies of combustion of crystalline boron, trimethylamineborane, and diammonium decaborane were determined. Carbon dioxide, water, fluoboric acid in excess aqueous HF, and (for boron compounds) gaseous nitrogen were combustion products. The enthalpy of solution of orthoboric acid was measured in a hydrofluoric acid solution to yield the same fluoboric acid solution obtained in the boron combustion experiments. The derived values of the enthalpies of formation, $\Delta Hf°$ 298.15, from graphite, β, rhombohedral boron, and gaseous hydrogen and nitrogen are: orthoboric acid (c), $-261.4_7 \pm 0.2_0$ kcal mole^{-1}; trimethylamineborane (c,III) $-34.0_4 \pm 0.5_5$ kcal mole^{-1}; and diammonium decaborane (c), $-85.8_4 \pm 2.5_0$ kcal mole^{-1}. The enthalpy values obtained were used in conjunction with other thermochemical data from the literature to derive further enthalpy values for other boron compounds. L.S.

N65-28976# Mallinckrodt Chemical Works, Weldon Spring, Mo. Uranium Div.

PROCESS DEVELOPMENT QUARTERLY PROGRESS REPORT, JANUARY–MARCH 1965

J. A. Nelson, ed. 1 May 1965 25 p refs (Contract W-14-108-ENG-8) (MCW-1492)

The following research papers are summarized: *The Determination of Calcium in Uranium Ore Concentrates by X-ray Fluorescence; Electrolytic Preparation of Uranium Metal From Uranium Dioxide Using a Frozen-Crust Cell; A Spectromchemical Method for the Determination of Uranium in Electrolyte; A Gas-Flow Proportional Counter for Electron Probe Light Element Analysis;* and *A Spectrochemical Method for the Routine Determination of Impurity Elements in High-Purity Thorium Compounds.* Use of a frozen crust of electrolyte on the walls of the cathode crucible permitted production of sound uranium metal from uranium dioxide at greater than 65% current efficiency in laboratory cells. Careful control of the composition of the CaF_2-LiF-UF_4 electrolyte, a low-current density, and a steep temperature gradient are necessary to obtain satisfactory results. The spectrochemical method for the determination of uranium in electrolyte in the range between 1% and 2.0% uranium gave an overall precision of 2.0% at the 95% confidence level at midrange. The determination can be completed within 1/2 hour after receipt of the sample. Also, the method is characterized by a high degree of freedom from matrix effects. E.E.B.

N65-28986# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Stuttgart (West Germany).

HANDLING OF ELEMENTAL FLUORINE: PRACTICAL EXPERIENCES [PRAKTISCHE ERFAHRUNGEN BEIM ARBEITEN MIT ELEMENTAREM FLUOR]

R. Lo Mar. 1965 23 p In GERMAN; ENGLISH summary (DVL-413; DLR-FB-65-12) Available from Zentralstelle für Luftfahrtdokumentation und Information (ZLDI): 5.80 DM

Operating experiences with installations for the electrolytical production of fluorine, its liquefaction and the performance of combustion tests with compressed fluorine are described. The required safety measures are stated. Author

N65-28991# Los Alamos Scientific Lab., N. Mex.

THE DETERMINATION OF PLATINUM IN URANIUM–PLATINUM ALLOYS BY ELECTROLYTIC DEPOSITION

Ross D. Gardner, Carter H. Ward, and William H. Ashley 4 Jan. 1965 11 p refs (Contract W-7405-ENG-36) (LA-3176)

The electrolytic method for the determination of platinum has been applied and critically evaluated for the determination of platinum in uranium-platinum alloys. It was established experimentally that this method gives excellent results when applied to alloys containing from 0.1 to 5.0 percent platinum. An average recovery of 99.9 percent with a relative standard deviation of 0.6 percent was obtained for the analysis of 55 sample solutions simulating uranium-platinum alloys in that range. Author

N65-28995# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PREPARATION OF DIAMIDE OF PERFLUORGLUTARIC ACID

I. M. Dolgopol'skiy and G. B. Fedorova 27 Apr. 1965 4 p Transl. into ENGLISH from Russian Patent No. 147183 (Appl. No. 723118/23, 24 Mar. 1961) 2 p (FTD-TT-64-1277/1)

The object of the invention is a method of obtaining diamide of perfluorglutaric acid which is distinguished by the fact that, for the purpose of using by-products in the production of perfluorglutaronitrile imide, perfluorglutaric acid is subjected to interaction with ammonia. Author

N65-29018# National Bureau of Standards, Washington, D. C.

EFFECT OF LIGHT ON COPPER OXIDE FILM GROWTH Technical News

Feb. 1965 6 p refs (STR-3136)

It has long been known that light stimulates the migration of electrons in semiconductors. A recent NBS study provides a better understanding of this process. The study shows that during growth of semiconducting copper oxide films the movement of electrons creates a change in the charge on the Cu^+ ion which produces a retarding effect on the growth process. Author

N65-29027# Research Triangle Inst., Durham, N. C. Measurement and Controls Lab.

A RADIO-RELEASE TECHNIQUE FOR TRACING STREAM FLOWS Final Report

Harold G. Richter and Arthur S. Gillespie, Jr. Washington, AEC, 31 Aug. 1964 30 p refs
(Contract AT(40-1)-2513)
(TID-21881) CFSTI: $2.00

A radio-release technique for measuring the volume flow rate for streams has been developed. Sodium metavanadate or sodium dichromate is discharged into the stream at a known rate and water samples downstream are collected and assayed by pouring the samples through a radioactive silver column at pH < 3. Silver ion is released by the oxidation process and is assayed radiometrically. From the dilution factor, the volume flow rate of the stream can be calculated. Interferences from Fe(III) in natural water can be reduced or eliminated by complexing with a mixture of H_3PO_4 and ethylenediaminetetraacetic acid. Interference from Cl^- ion precipitation of the Ag^+ is eliminated by the addition of 1,3-diethyl-2-thiourea to complex the silver. Concentrations down to 0.1 ppm vanadium (V) or Cr(VI) can be determined. Suspended material in natural water presents a problem that was only partially solved. The method then is limited to systems with reasonably clear water. Author

N65-29036# United Kingdom Atomic Energy Authority, Risley (England).
ANALYTICAL METHOD FOR THE VOLUMETRIC DETERMINATION OF MOLYBDENUM IN URANIUM–MOLYBDENUM ALLOY
W. Davies and W. Gray 1965 6 p
(TRG-961(D)) HMSO: 1s 3d

To determine the concentration of molybdenum in the uranium–molybdenum fast reactor fuel element alloy, a concentrated hydrochloric acid solution containing both the U and Mo in their six-valent states is prepared. The solution is then titrated potentiometrically with standard ferrous solution at room temperature, using a platinum indicator electrode and a saturated calomel reference electrode. This reduces Mo to its five-valent state while the U is unchanged. Concentration range of Mo is found to be from 5% wt/wt to 15% wt/wt. When dealing with alloy containing more than 8% wt/wt of Mo, bias is less than 0.5% of Mo content, and the coefficient of variation is less than 1.0% of the Mo content. M.W.R.

N65-29060# Manchester Univ., Macclesfield (England). Dept. of Metallurgy.
THE VAPOUR PHASE DEPOSITION OF BORON ON TITANIUM BY THE REACTION BETWEEN GASEOUS BORON TRICHLORIDE AND TITANIUM METAL Final Report
D. J. Cameron and R. A. J. Shelton Mar. 1965 55 p refs
(Contract A/WIN/EMR/92)
(AEEW-R-424) HMSO: 9s

The reaction between boron trichloride vapor and titanium has been investigated in the temperature range 200–1350° C. It has been found that an initial reaction leads to the formation of titanium tetrachloride and the deposition of boron on titanium, but that except for reactions between 900 and 1000° C, the system is complicated by the formation of lower titanium chlorides due to secondary reactions between the titanium and titanium tetrachloride. Author

N65-29089# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LIQUID SCINTILLATOR
L. M. Kutsyna 19 Apr. 1965 4 p Transl. into ENGLISH from Soviet Patent no. 155881 (Appl. no. 769102/26-24, 15 Mar. 1962) 2 p
(FTD-TT-64-1283/1; AD-614965)

A liquid scintillator, intended for use in radiology and dosimetry, and distinguished by its content of tributylphosphate, methylnaphthaline, and the activator 2, 5-diphenyloxazole, is described. These constituents increase the effectiveness and lessen the volatility. TAB

N65-29092# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SYNTHESIS AND INVESTIGATION OF PROPERTIES OF CERTAIN HOMOGENEOUS AND MIXED POLYBENZIMIDAZOLES
V. V. Korshak, T. M. Frunze, V. V. Kurashev, and G. P. Lopatina 5 May 1965 10 p refs Transl. into ENGLISH from Vysokomol. Soedineniya (USSR), v. 6, no. 7, 1964 p 1251–1255
(FTD-TT-64-1356/1+2; AD-615865)

The synthesis of a number of homogeneous and mixed polybenzimidazoles has been carried out and their properties have been investigated. The polybenzimidazoles were prepared by polycondensation of 3,3'—diaminobenzidine with the diphenyl esters of the following dicarboxylic acids: isophthalic, terephthalic, sebacic and bis-(p-carboxyphenyl) methylphosphin oxide. An attempt was also made to obtain fluorine—containing polybenzimidazole from the same tetramine and diphenyl perflourodipate. Author

N65-29099# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ALPHA–FERROCENYLCARBONIUM SALTS
A. N. Nesmeyanov, V. A. Sazonova et al 11 May 1965 9 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (USSR), v. 160, no. 2, 1965 p 355–358
(FTD-TT-65-433/1; AD-615870)

A reaction product, ferrichloride diphenylferrocenylcarbonium, was separated in the destruction of the ferrocene with perchloric acid. At first a dark bluish crystalline salt, insoluble in ester and in benzene, but soluble in acetone and nitromethane, is formed. When water is added to the acetone solution of the salt, the diphenylferrocenylcarbonium intermediate is instantaneously formed. The reaction product is compared to the product (6,6-diphenylfulvene) obtained when ferrocene is destroyed with concentrated hydrochloric acid. Other compounds isolated with the ferrocene molecule include relatively stable salts of ferrocenylcarbonium perchlorate and tetraphenylborate (from ferrocenylphenylcarbinol in an acetic acid solution during the action of $HClO_4$, and tetraphenylboronsodium respectively). Thermal decomposition of tetraphenylborate of ferrocenylphenycarbonium in nitromethane at 50° leads to a mixture of approximately equal amounts of diasteromers 1,2-diphenyl-1 and 2-diferrocenylethane. Yields, analyses, melting points, and composition analyses for all starting, intermediate, and final compounds are given. L.S.

N65-29102# Technische Hochschule in Graz (Austria). Institut für Physikalische Chemie.
STUDIES OF PREPARATION AND PROPERTIES OF ACTIVE ALKALI AZIDES AND BARIUM AZIDE AND EFFECTS OF THIS ACTIVITY ON THERMODYNAMIC AND THERMOCHEMICAL DATA Final Technical Report, 1 May 1964–30 Apr. 1965
Karl Torkar [1965] 121 p refs
(Contract DA-591-EUC-3320)
(AD-466783)

Measurement of dependence of ionic conductivity on temperature were carried out with single crystals and pellets

of sodium azide. An energy of disorder of 1.9 ev was determined from activation energies of high and low temperature conductance. With the Kronig–Penny potential representing the periodic potential of a solid, ground state and excited states were discussed. Na-azide freed of polyvalent foreign ions by ion exchange was doped by different methods and the influence of doped impurities on decomposition was determined. By means of conductivity measurements during dynamical decomposition, an atomic diffusion process due to nucleation and nuclei growth was found. Dependence of reaction constant of decomposition on particle size led to the programming of decomposition by particle size distributions. Thermal decomposition was shown to require the presence of an undisturbed contact between sodium nuclei and undecomposed azide. The investigation of the system barium azide-water led to preparation of three defined compounds; barium azide anhydrous, nonhydrate and sesquihydrate. With X-ray investigations a phase diagram of the barium azide-water system was drawn. Author

N65-29123# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHOD OF DEPARAFFINIZATION
A. A. Chesnokov, K. M. Badyshtova, and K. K. Denisenko 14 Apr. 1965 4 p Transl. into ENGLISH from Soviet Patent no. 161847 (Appl. No. 855004/23-4, 31 Aug. 1963 1 p (FTD-TT-64-1196/1; AD-614959)

A method is described for removing tarry substances from the residual refined oil products of selective purification which negatively affect the filtration rate in deparaffinization work. The method uses hydraulic purification, increases the rate of filtration by 47%, and the deparaffinized oils obtained require no further prepurification. Comparative data for oils obtained with the use of the hydraulic purification before and after the process of deparaffinization are tabulated. R.N.A.

07 COMMUNICATIONS

Includes communications equipment and techniques; noise; radio and communications equipment and techniques; noise; radio and communications blackout; modulation telemetry; tracking radar and optical observation; and wave propagation. For basic research see: 23 Physics, General; and 21 Navigation.

N65-27986 Joint Publications Research Service, Washington, D. C.
RECONCILIATION OF THE MESSAGE SOURCE WITH THE CHANNEL BY THE METHOD OF REARRANGEMENT OF SPECTRA
I. A. Ovseyevich and M. F. Pinsker *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 112–120 refs (See N65-27975 17-34) CFSTI: $6.00

A procedure is given for processing of messages and signals which permits in combination with linear preselection and direction making of the mean square deviation of the message received from that transmitted close to the minimal deviation indicated in information theory. Author

N65-27987 Joint Publications Research Service, Washington, D. C.
NONLINEAR FILTRATION AND QUASIOPTIMAL NATURE OF FREQUENCY PHASE AUTOTUNING
V. I. Tikhonov *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 121–138 refs (See N65-27975 17-34) CFSTI: $6.00

The derivation of the equation for nonlinear filtration theory is presented for a random (Markov) parameter of a signal received against a background of additive white noise, and a gaussian approximation is considered. The use of advance information about the statistical dynamics of frequency phase autotuning permits obtaining the equations of nonlinear filtration for it from which follows the quasioptimal nature of a typical system of frequency phase autotuning as a device which tracks the random phase of a radio signal. Author

N65-28117# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INTERFERENCE RESISTANCE OF TRANSMISSION OF REMOTE CONTROL COMMANDS WITH THE USE OF DUPLICATION AND ACCUMULATION
B. Ya. Sovetov 5 Feb. 1965 14 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Priborostr. (Leningrad), v. 6, no. 4, 1963 p 30–37
(FTD-TT-64-935/1+2; AD-611528)

The interference resistance of the duplicating and accumulation principle when using various types of codes is discussed, and the probability of protective failure of the system at single transmission of announcement is evaluated. The analysis shows that: (1) Under the effect of an incidental pulsed interference on the codes, the employment of the duplicating principle decreases the probability of protective failure in operation of the system, but raises the probability of transformation of announcements. (2) The use of the accumulation principle offers the possibility of duplicating even codes, formulated for all combinations. (3) It is convenient to use the principle of accumulation in combination with correcting code to reduce transmission time. E.E.B.

N65-28170# Harvard Univ., Cambridge, Mass. Cruft Lab.
EXCITATION OF A SURFACE WAVE ALONG AN INFINITE YAGI-UDA ARRAY
Robert J. Mailloux 12 Oct. 1964 42 p refs
(Contract Nonr-1866(32); Grant NSF GP-851)
(TR-456; AD-610666)

The fundamental integral equations defining the current along the dipoles of an infinitely long Yagi-Uda array excited by a single delta function voltage source are reduced to a system of simultaneous algebraic equations by the use of the King-Sandler array theory. This system is solved by identifying it with a summation equation and applying a technique analogous to the use of Fourier transforms on integral equations. The resulting solution is made up of a term associated with a surface wave, and terms which decay with increasing distance from the source dipole. The wave term is found explicitly from this summation equation solution and the remaining terms are evaluated approximately by reverting back to the original matrix equation. Finally, a variational procedure is developed and yields an accurate stationary solution for the input impedance when the approximate dipole currents are used as trial functions. Author

N65-28188# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STOCHASTIC AGGREGATES AND QUESTIONS IN THE THEORY OF INFORMATION

V. V. Chavchanidze 15 Apr. 1965 13 p refs Transl. into ENGLISH from Tr. Inst. Fiz., Akad. Nauk Gruzin. SSR (Tiflis), v. 8, 1962 p 277–285
(FTD-TT-64-1155/1; AD-615221)

Finite messages are considered in this work. The formula of finite message entropy is deduced. It is more general than Shannon's formula; when the length of the message N approaches infinity, Shannon's formula is obtained. The theory of general and Boolean stochastic aggregates is considered. The formula deduced is used and realizes the method of Markov–Chandrasekhar for discrete random magnitudes. The interpretation of the theory is given in the field of the algebra of logic. Author

N65-28206# RAND Corp., Santa Monica, Calif.
REFLECTION OF ELECTROMAGNETIC WAVES FROM A ROUGH SURFACE
M. G. Kivelson and S. A. Moszkowski May 1965 17 p refs
(Contract AF 49(638)-700; Proj. RAND)
(RM-4468-PR; AD-615712)

It has been shown that in the small wavelength limit the backscattering cross section per unit area from a rough reflecting surface is given by

$$\frac{d\sigma_B}{d\Omega} = \frac{1}{2} P(\psi)$$

where $P(\psi)$ = the probability that the normal to the surface makes an angle ψ with respect to a reference surface. Author

N65-28233# General Electric Co., Philadelphia, Pa. Missile and Space Div.
A MISSION COST MODEL FOR FERRET SATELLITES
H. C. Sebring 1 May 1965 26 p refs Presented at the 27th Natl. Meeting, Operations Res. Soc. of America, Boston, 6–7 May 1965
(TIS-65SD236; AD-615759)

An analytical model to evaluate ferret satellite systems is explicated. It may also be used to yield inputs for specific system definition. In addition to the general stochastic nature of radar signal detection, analyses are applied to the cases of unknown emitter bandwidths and to the detection of known frequencies. The conditions of emitter operation and overflight are included. The signal detection probability is implicitly an input to a cost effectiveness methodology which considers major parameters such as orbital altitude, payload weight, reliabilities, launching requirements and costs, weights and costs of satellites and ancillary equipment, and total mission cost to achieve objectives with predetermined confidence. Logic is drawn from the model to support the conclusion that, ignoring safety tolerances, the minimum orbital altitude related to the desired lifetime is preferred. Numerical examples are presented; however, the principal purpose of the paper is to document the analytical method. There is no application to specific systems that might be postulated. Author

N65-28237# Wagner (Daniel H.) Associates, Paoli, Pa.
THEORY OF CUMULATIVE DETECTION PROBABILITY
Edward P. Loane, Henry R. Richardson, and Edward S. Boylan 10 Nov. 1964 110 p refs
(Contract N-140(70024)74322-B)
(AD-615497)

Cumulative detection probability, cdp, is defined as probability of at least one success in n trials. "Success" means that the (signal) stochastic process exceeds a given threshold. Exact formulas or approximations for cdp are given in the cases where the process being sampled in the trials is two-state Markov, Gaussian, "step," and "step-plus-jitter." In the two-state Markov case, taken largely from others, k-success formulas are also given. Finding cdp is equivalent to finding the distribution of the maximum of a sequence of random variables and to finding a cumulative multivariate distribution. Author

N65-28253 Joint Publications Research Service, Washington, D. C.
SIGNAL SPECTRA IN A MAGNETIC RECORDING CHANNEL FOR INFORMATION OBTAINED FROM MEASUREMENTS
R. Ya. Syropyatova *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 18–26 refs (See N65-28250 17-10) CFSTI: $5.00

Presented is an analysis of output signal spectra obtained with unilateral pulse wide modulation and pulse frequency modulation. Discussed are input signal conversions in a magnetic channel by these two methods, and distortions connected with these conversions. Recommendations are given on selecting the type and parameters of modulation for a given value of nonlinear distortions. S.C.W.

N65-28261 Joint Publications Research Service, Washington, D. C.
THE STRUCTURE OF ENCODING AND DECODING DEVICES FOR REALIZING NON-BINARY CODES IN TELEMETRY
V. I. Vasil'yev *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 77–84 refs (See N65-28250 17-10) CFSTI: $5.00

A theoretical analysis of the principles used in the construction of encoding and decoding devices which permit the use of nonbinary codes with a varied number of code conversions in telemetry systems is presented. Emphasized is the use of binary and binary–decimal codes with a number of code conversions for encoding information. Included are structural diagrams which demonstrate the accuracy of the approach. Also considered are codes for discovering and correcting errors induced by pulse interference. S.C.W.

N65-28330# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHODS OF AUTOMATIC MEASUREMENT OF POLARIZATION CHARACTERISTICS WITHIN THE LIMITS OF THE WHOLE DIAGRAM OF DIRECTIVITY OF THE ANTENNA
Yu. I. Logachev and V. A. Torgovanov 28 Apr. 1965 7 p Transl. into ENGLISH from Russian Patent No. 155190 (Appl. No. 775190/26-9, 23 Apr. 1962) 2 p
(FTD-TT-64-1281/1+2; AD-615293)

The object of the invention is a method of automatic measurement of the polarization characteristics within the limits of the whole diagram of the directivity of an antenna which is distinguished by the fact that for the purpose of considerably heightening the productivity of the work in the measurement of the polarization characteristics of antennas one simultaneously revolves the transmitting antenna around the horizontal axis and the tested one around the vertical one and while this is going on the speed of the transmitting antenna is considerably higher than the speed of the tested one. The value for the coefficient of ellipticity then is judged by the depth of the modulation of the signal received. Author

N65-28372# Lincoln Lab., Mass. Inst. of Tech., Lexington.
ON THE MEASUREMENT OF ATMOSPHERIC MULTIPATH AND DOPPLER SPREAD BY PASSIVE MEANS
Barney Reiffen 5 Mar. 1965 24 p refs *Its* Tech. Note 1965-6
(Contract AF 19(628)-500)
(ESD-TDR-65-55; AD-614787)

The literature contains several procedures for the measurement of multipath and Doppler spread characteristics of a linear time-varying filter. These procedures imply processing which has access to the input waveform. For satellite communications applications, there is interest in determining the multipath and Doppler spread introduced by the atmosphere at microwave frequencies. A method is proposed in this report which permits determination of these properties without the need for launching a satellite to be used as a signal scatterer or generator. The sun or the moon is used as a source of power. An autocorrelation technique is shown to yield an estimate of the channel multipath; a dual procedure is shown to yield an estimate of Doppler spread. The effect of the receiver's front-end noise and filter is considered. Various unanswered questions are raised. Author

N65-28534# Boeing Co., Renton, Wash. Airplane Div.
ORTHOGONAL DETECTION OF RADAR TARGETS IN RAIN AT K_u-BAND
G. L. Jonsen and R. J. Friedland [1965] 13 p
(D6-16136)

A series of photographs is shown of the data obtained from the K_u-band radar system which was modified to reduce clutter due to weather conditions. This modification permits either horizontally- or vertically-polarized linear transmission, and simultaneous reception of both co-polarized and cross-polarized signal return. The difference in the polarization properties between precipitation and desired targets is used as a basis for discrimination. Photographs give comparison of the co-polarized radar return from various waterborne and airborne targets under diverse rain conditions and show that clutter is greatly reduced in the cross-polarized channel, and the detection of targets in that channel is greatly enhanced. M.R.W.

N65-28573# Joint Publications Research Service, Washington, D. C.
INCREASING THE EFFECTIVE AREA OF THE ANTENNA OF A RADIOTELESCOPE BY REDUCING SCATTERING FROM THE SUPPORTS
P. D. Kalachev et al 13 Jul. 1965 16 p refs Transl. into ENGLISH from Tr. Fiz. Inst., Akad. Nauk SSSR, Radioteleskopy (Moscow), v. 28, 1964 p 104–115
(JPRS-31070; TT-65-31568) CFSTI: $1.00

The matter of calculating the effect of scattering by the supports of the circular mirror radiotelescope and a method for reducing the influence of its effect are examined. Areas of discussion included: (1) scattering of the supports and the effective area of the antenna of a radiotelescope; (2) resting of the supports on the edge of the mirror and its deformation; and (3) deformations of the support rods and their construction. N.E.A.

N65-28612# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE TECHNIQUE OF OBSERVING ARTIFICIAL SATELLITES
M. Steinbach 20 Apr. 1965 32 p refs Transl. into ENGLISH from Feingeratetechnik (E. Berlin), no. 11, 1963 p 515–523
(FTD-TT-64-831/1+2; AD-465349)

The present article is to give an insight in the method of passively observing artificial earth satellites. By passive observation we mean that the satellite is observed by the beams that are reflected or transmitted from the satellite. Modulations of these beams by instruments aboard the satellite are not taken into consideration. Author

N65-28649# Radiation Inc., Melbourne, Fla.
MOLECULARIZED PCM TELEMETRY TRANSMITTING SET Final Technical Documentary Report, Jun. 1962–Jun. 1964
William A. Price, J. D. Corry, D. D. Mc Rae, B. R. Evans, W. M. Hailey et al Wright-Patterson, AFB, Ohio, AF Avionics Lab., Aug. 1964 219 p refs
(Contract AF 33(657)-9033)
(AL-TDR-64-206; AD-615548)

A program concerned with advancing the state-of-the-art of pulse code modulation telemetry through the application of molecular electronic techniques was continued. A system design compatible with molecular technology and having a 200 kc bit rate, a bit rate stability of ±1%, a resolution of eight bits, and a capacity of 127 analog and 33 bilevel channels was chosen. The details of the system design, the device design and fabrication, and the assembly and test of the resulting electrical feasibility model are discussed. The resulting system performance is presented together with the tests used for evaluation. R.N.A.

N65-28749# Philco Corp., Blue Bell, Pa. Ground Based Radar Lab.
NON-PLANAR ARRAY "THINNING" STUDY Second Technical Report, 1 Jul.–15 Oct. 1964
Charles E. Clarke and Thomas J. B. Shanley Griffiss AFB, N. Y., RADC, Mar. 1965 67 p refs *Its* Rept.-2594-2
(Contract AF 30(602)-3337)
(RADC-TR-64-510; AD-614906)

The main accomplishments are: a. Development of analytical expressions for the means and variances of the normally distributed quadrature components of the far field for a randomly thinned spherical array with a radius of about 60 wavelengths, using one-quarter of the sphere as an active cap. b. Programs for the general-purpose computer which will generate far-field patterns for spherical arrays thinned to any desired percentage fill and using various degrees of element directivity. c. Development of analytical expressions, valid for any angle θp off the main-beam axis, for the means and variances of the far field as functions of θp and a valid analytical technique for estimating the probability that no sidelobe in a prescribed range of θp exceeds a specified level. Author

N65-28792# Autonetics, Anaheim, Calif.
LABORATORY STUDIES IN AIR-TO-GROUND TARGET RECOGNITION. I: PROGRAM DESCRIPTION AND INITIAL VISUAL RECOGNITION DATA
H. L. Snyder and R. L. Calhoun 12 Apr. 1965 47 p refs
(T5-132/3111)

The first section of this report presents a summary of work done by the Autonetics Human Factors Department on problems of air-to-ground target recognition. The second section presents data on visual target recognition obtained in laboratory studies and compares these data with airborne recognition data for the same targets. Results indicate that recognition probabilities for these targets were generally high both in the laboratory and in the air, but recognition ranges were substantially smaller in the laboratory. Author

N65-28796# Dayton Univ., Ohio.
ATMOSPHERIC PROPAGATION STUDIES AT OPTICAL MILLIMETER, AND MICROWAVE FREQUENCIES. PART II: THE MECHANISM OF SCINTILLATION
Paul B. Taylor Wright-Patterson AFB, Ohio, AF Avionics Lab., Mar. 1965 20 p refs
(Contract AF 33(615)-1265)
(AFAL-TR-65-79, Pt. II; AD-466031)

It is found that the scintillation observed in the microwave signal is not out of line with the statistical theories of propagation through a randomly homogeneous atmosphere which have been proposed by others. However, a precise description of the mechanism is still wanting. The scintillation observed in the optical signal is more violent than any previously reported, and shows characteristics at variance with the statistical theories of the atmosphere presented in the literature—namely, in the occurrence of short intense bursts of signal superimposed on a low-level randomly fluctuating background. Scintillation in analogous phenomena, especially that of radio and optical stars, shows indications of similar traits. The several explanations which have been proposed are mutually at variance, and none stands up well under criticism. Further experiment and study is required if a tenable explanation is to be established. Author

N65-28801# Rome Air Development Center, Griffiss AFB, N. Y. Communications Research Branch.

DATA ANALYSIS OF ECHO I, II, AND THE MOON. VOLUME II: POWER SPECTRAL DENSITY ANALYSIS OF PASSIVE SATELLITE REFLECTED SIGNALS

S. L. Zolnay May 1965 60 p refs

(RADC-TR-65-67, Vol. II; AD-466026)

This report deals with the power spectral density of passive satellite (Echo I, Echo II, and Moon) reflected signals. The prime objective is to present the power spectral density curves of pulsed cw and cw-type signals reflected by Echo II during selected passes of its first 2000 revolutions. Comparisons are made between the spectra of various types of signals reflected by the same satellite; between the spectrum of the same signal reflected by the various satellites; and between the spectrum of the same signal reflected by the same satellite in various path geometries. The conclusions are based on the available data and show that the spectrum of a signal reflected by Echo I differs only negligibly from that of Echo II, while the moon data exhibit details ascribable to considerably more surface roughness than either artificial satellite. The spectrum from Echo II indicate that possible deterioration is resulting in increased surface roughness of the satellite and that the path geometry possibly influences the data. Author

N65-28806*# Perkin-Elmer Corp., Norwalk, Conn.

DETERMINATION OF OPTICAL TECHNOLOGY EXPERIMENTS FOR A SATELLITE

Herbert F. Wischnia, Harold S. Hemstreet, and John G. Atwood Washington, NASA, Jul. 1965 360 p refs

(Contract NAS8-11408)

(NASA-CR-252) CFSTI: HC $7.00/MF $1.75 CSCL 17H

Experiments to be conducted in an earth satellite vehicle which will best advance the development of optical technology in space are presented. The field of consideration was limited to optical communication and certain closely related general aspects of optical astronomy and optical scientific instrumentation in space. Thirteen experiments were recommended divided into five subgroups: atmospheric, eye–hand loop, heterodyning, tracking and acquisition, and communications. The following are discussed in detail: *Atmospheric Scintillation; Atmospheric Effects on Polarization; Remote Manual Optical Alignment; Optical Heterodyne Detection in the Satellite; Optical Heterodyning on Earth; One-Tenth Arc-Second Tracking Demonstration; Point-Ahead; Space-to-Ground-to-Space Loop Closure; Tracking Demonstration in the Presence of Spacecraft Motion; Suspension Systems Comparison; Tracking Transfer Demonstration from Ground Station A to Ground Station B; Earthshine Effects on Acquisition and Tracking;* and *Communication at 10^7 CPS.* E.E.B.

N65-28818# National Bureau of Standards, Boulder, Colo. Central Radio Propagation Lab.

QUARTERLY RADIO NOISE DATA, DECEMBER, JANUARY, FEBRUARY, 1963–64

W. Q. Crichlow, R. T. Disney, and M. A. Jenkins 25 Jan. 1965 92 p refs

(NBS-TN-18-21) GPO: $0.50

Radio noise measurements made at eighteen radio noise recording stations in a world-wide network for the months of December, January, and February are presented. The measurements are presented as tabulated values based on three basic parameters of the noise; these are the mean power, the mean envelope voltage, and the mean logarithm of the envelope voltage. R.N.A.

N65-28856*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

TELEVISION TESTS WITH THE SYNCOM II SYNCHRONOUS COMMUNICATIONS SATELLITE

Varice F. Henry and Michael E. Mc Donald Washington, NASA, Jul. 1965 20 p refs

(NASA-TN-D-2911) CFSTI: HC $1.00/MF $0.50 CSCL 17B

The results of a series of experimental tests employing a reduced video bandwidth of 2.5 Mc with the restricted radio frequency bandwidth of 5 Mc in the Syncom II satellite are described. These tests were designed to explore the feasibility of television transmissions for demonstration purposes only because the original system design parameters were based on a few channels of voice transmissions. Emphasis is placed on the microwave parameters of the transmitting and receiving ground terminals, located at Ft. Dix, New Jersey and Andover, Maine respectively. Quantitative and qualitative evaluations of the results are presented, as well as recorded samples of the received video signals which represent the first successful transmissions of standard monochrome television signals in real-time through a synchronous satellite. Author

N65-28864# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EQUIPMENT FOR STUDYING THE STATISTICAL CHARACTERISTICS OF RADIO ECHOS

A. G. Gorelik 4 May 1965 12 p refs Transl. into ENGLISH from Tr. Vses. Nauchn. Meteorol. Soveshch. (USSR), v. 9, 1963 p 161–166

(FTD-TT-65-97/1+2; AD-615532)

Realization of a method of measuring meteorological parameters led to the creation of auxiliary equipment for radar stations used for aerological studies. Author

N65-28867*# Kansas Univ., Lawrence. Engineering Science Div.

SCATTERING THEORIES AND RADAR RETURN

Adrian K. Fung [1965] 159 p refs *Its* Rept.-48-3

(Grants NsG-298; NSF GP-2259)

(NASA-CR-63875) CFSTI: HC $5.00/MF $1.00 CSCL 17I

The Kirchhoff–Huygens method is used to investigate wave scattering from a rough surface in the far zone. Terms involving the first or second partial derivatives of the surface are considered and found to be important for angles of incidence greater than or equal to 20° in the case of backscattering. Statistical surface parameters obtained through fitting experimental curves are frequency sensitive and are effective parameters rather than real parameters of the surface. When the incident wavelength is about four times the actual standard deviation of the surface, the statistical parameters obtained

through fitting the experimental curves are the actual ones. The range of structure sizes present on a surface can be obtained by examining a more detailed surface-height autocorrelation function. A close fit between theory using such an autocorrelation function and moon and earth data is obtained over a range of incident angles from normal incidence to 80° from normal. It appears that large scale features determine the return at near normal incidence and small scale features determine that from nearer grazing incidence. R.N.A.

N65-28879# Joint Publications Research Service, Washington, D. C.
THE THEORY OF TRANSMITTING DISCRETE INFORMATION
L. M. Fink 21 Jul. 1965 451 p refs Transl. into ENGLISH of the book "Teor. Peredachi Diskretnykh Soobshch. Moscow, Sov. Radio Pub. House, 1963 p 1-576
(JPRS-31-202; TT-65-31699) CFSTI: $7.00

This monograph is devoted to an exposition of the problems of the theory of transmitting discrete information. It sets forth the fundamental positions of information theory and the theory of potential noise-resistance. It derives expressions which describe the carrying capacity and reception reliability of communications channels with constant and variable parameters. Recommendations are made for the selection of optimum signalling systems and optimum reception methods depending on the properties of the channels and of the noise active in them. Author

N65-28897# Army Electronics Labs., Fort Monmouth, N. J.
NANOSECOND PULSE TECHNIQUES
Michael A. Fanuele Mar. 1965 21 p refs
(ECOM-2565; AD-615650)

As part of a program to study the feasibility of applying high resolution techniques to combat surveillance radars, selected electronic switching devices capable of generating nanosecond pulses were investigated and certain operational characteristics determined. These devices were: hydrogen thyratrons, switching transistors, avalanche transistors, and snap-off diodes. Pulses were generated down to one nanosecond at pulse repetition frequencies up to 50 megacycles. Hydrogen thyratrons and avalanche transistors were used in modulators to produce RF pulses approximately ten nanoseconds wide. Further investigations into the various schemes for developing nanosecond pulses are recommended as well as efforts toward development of additional nanosecond pulse techniques. Author

N65-28900# Weapons Research Establishment (Australia).
DETECTION OF MISSILES BY THE OPTICAL EQUIPMENT AT WOOMERA
B. W. Koerber Mar. 1965 18 p refs
(WRE-PAD-93)

A satisfactory method of analysis has been developed for problems involving the detection of missiles using optical observation systems. The application of the theory of detection requires investigations of the factors which influence the radiance of the missile, the atmospheric factors which reduce the apparent contrast of the object with respect to its background, and the properties of the receptor systems used. This report summarizes the progress which has been made in this study by O.M.I. Group, together with proposals for future investigations in this field. Author

N65-28913# National Bureau of Standards, Boulder, Colo. Radio Standards Lab.
TABLE OF ATTENUATION AS A FUNCTION OF VANE ANGLE FOR ROTARY-VANE ATTENUATORS ($A = -40 \log_{10} \cos \theta$)
Wilbur Larson 7 Jan. 1965 91 p refs
(NBS-TN-229) GPO: $1.25

The table of attenuation as a function of vane angle gives the attenuation in decibels produced by an angular displacement of the vane of a rotary-vane attenuator assuming ideal behavior of the attenuator. The attenuations for vane angles corresponding to the function $A = -40 \log_{10} \cos \theta$ are given in the table, where A is the attenuation in decibels and θ is the vane angle in degrees. The attenuations in decibels are given for increments of 0.001° for the values of θ from zero to 89.999° to the sixth decimal place and for the values of θ from 89.000° to 89.999° to the fifth decimal place. The table was designed for determining the attenuation in decibels of a rotary-vane attenuation utilizing a scale marked in degrees. Also, the table can be used to determine correct decibel markings for a rotary vane attenuator with a direct reading scale regardless of gear ratio. The table can be used as an aid in analyzing the calibration data of a rotary-vane attenuator for characteristics which include inherent error, resettability, and gearing eccentricity. Author

N65-28917*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PLASMA EFFECTS ON APOLLO RE-ENTRY COMMUNICATION
Richard Lehnert and Bernard Rosenbaum Washington, NASA, Mar. 1965 19 p refs
(NASA-TN-D-2732) CFSTI: HC $1.00/MF $0.50 CSCL 17B

Effects of plasma formation on electromagnetic wave propagation during the Apollo spacecraft re-entry from lunar missions are considered for nominal and emergency re-entry trajectories. Concepts of the Apollo re-entry ground support network are discussed in the light of effects of RF signal blackout on tracking and communication. The degree of predictability of blackout areas and the generation of ameliorative methods against blackout are of primary concern. Goddard Space Flight Center's previous efforts on this subject are summarized and future plans of action along this line are outlined. Author

N65-28935# Atomic Energy Establishment, Winfrith (England). Control and Instrumentation Div.
THE SIMULTANEOUS USE OF SEVERAL PSEUDO-RANDOM BINARY SEQUENCES IN THE IDENTIFICATION OF LINEAR MULTIVARIABLE DYNAMIC SYSTEMS
J. D. Cummins Feb. 1965 13 p ref
(AEEW-M-507) HMSO: 2s

With several white noise sources the various transmission paths of a linear multivariable system may be determined simultaneously. This memorandum considers the restrictions on pseudo-random two state sequences to effect simultaneous identification of several transmission paths and the consequential rejection of cross-coupled signals in linear multivariable systems. The conditions for simultaneous identification are established by an example, which shows that the integration time required is large i.e. tends to infinity, as it does when white noise sources are used. Author

N65-28952*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SIGNAL-TO-NOISE RATIOS IN MAGNETIC RECORDING
C. J. Creveling Washington, NASA, Jul. 1965 9 p refs
(NASA-TN-D-2952) CFSTI: HC $1.00/MF $0.50 CSCL 14C

In recording telemetry signals from scientific satellites at remote locations, for subsequent reduction at a central facility, the system signal-to-noise ratio is established at the receiver input terminals, when the input signal-to-noise ratio is low. Under these conditions the noise contributions of the tape recorder-reproducer are usually insignificant. Author

N65-29021# National Bureau of Standards, Boulder, Colo.
CHARACTERISTICS OF THE EARTH–IONOSPHERE WAVEGUIDE FOR VLF RADIO WAVES
J. R. Wait and K. P. Spies 30 Dec. 1964 98 p refs
(TN-300) GPO: $0.50

The principal results of this technical note are graphical presentations of the attenuation rates, phase velocities, and excitation factors for the dominant modes in the earth–ionosphere waveguide. The frequency range considered is 8 kc/s to 30 kc/s. The model adopted for the ionosphere has an exponential variation for both the electron density and the collision frequency, and the effect of the earth's magnetic field is considered. Comparison with published experimental data confirms that the minimum attenuation of VLF radio waves in daytime is approximately at 18 kc/s, while at night it is somewhat lower. The directional dependences of propagation predicted by the theory are also confirmed by experimental data. Author

N65-29025# Syracuse Univ. Research Corp., N. Y. Defense Systems Lab.
ATCBI-2 LINEAR SYSTEM AND ATCBI-3 LOGARITHMIC SYSTEM Final Report
James C. Doty Mar. 1965 84 p refs
(Contract FAA/ARDS-533)
(SRDS-RD-65-28)

Two methods of providing precision azimuth centermarks have been built for beacon navigation system. These methods utilize an amplitude monopulse beacon receiver. The receiver antenna pattern is split into sum and difference channels. The sum channel produces a conventional maximum output with a target on boresight, while the difference channel output nulls when a target is on boresight. By comparing the relative signal strength of the sum and difference channels, the target azimuth can be determined to less than a quarter of a degree. The first method described is the ATCBI-2 linear equipment. The sum and difference signals are amplified in linear IF amplifiers. The problem of varying signal strengths is solved by controlling the gain of the IF amplifiers with a sensitivity time control (STC). The second method described is the ATCBI-3 logarithmic equipment. One advantage is that a precision STC adjustment is not required. Logarithmic IF amplifiers are used which are inherently capable of handling signals of widely varying amplitudes. Author

N65-29034# National Research Council of Canada, Ottawa. Radio and Electrical Engineering Div.
AN APPLICATION OF PHASE MODULATION TO LOW-POWER TELEMETRY
G. L. Terreault and J. K. Pulfer Nov. 1964 10 p ref Transl. into ENGLISH from Eng. Inst. of Canada as EIC Trans. No. EIC-64-CE and A11 "La Modulation de Phase en Telemetrie de Basse Puissance."
(ERB-685)

The use of phase modulation in low-power telemetry is described. The differences between frequency modulation and phase modulation, as related to this application, are pointed out. Author

N65-29059# National Bureau of Standards, Boulder, Colo. Central Radio Propagation Lab.
BIBLIOGRAPHY ON TROPOSPHERIC PROPAGATION OF RADIO WAVES
Wilhelm Nupen 1 Apr. 1965 346 p refs
(NBS-TN-304) GPO: $2.00

Over a thousand abstracts or titles taken from the literature published between 1945 and 1964 are presented. The subject matter is confined to the effects of the earth's atmosphere on radiofrequency from 10 cps to 100000 Mc. The material is given under the following headings: *General Works; Theories, Formulas, and Models; Atmospheric Structure and Characteristics; Physico-Chemical Factors and Processes; Wave Characteristics; Radio Communication; Instruments, Equipment, and Design Considerations;* and *Techniques and Methods, Theoretical and Applied.* E.E.B.

N65-29072# IIT Research Inst., Chicago, Ill. Technology Center.
CONTINUOUS FACSIMILE SCANNER EMPLOYING FIBER OPTICS Second Quarterly Report, 1 Oct.–31 Dec. 1964
Donald A. Pontarelli 11 May 1965 30 p
(Contract DA-28-043-AMC-00164(E))
(IITRI-A6093-6; AD-615526)

Design of a copy advance mechanism has been completed and a prototype fabricated. The latter will be used to study and test mechanical parameters and features to provide data for the optimization of the final design. Serious and extensive consideration has been given to the problem of increasing the copy illumination level. A promising solution has been found and subjected to preliminary tests, but must be further tested under realistic conditions. The electronics of the GXC-5 system as well as individual components thereof have been thoroughly studied and analyzed. A study of susceptibility to radio frequency interference has also been initiated. Author

N65-29110# Air Force Cambridge Research Labs., Bedford, Mass.
ELECTROMAGNETIC PROPERTIES OF A PLASMA-COVERED ANTENNA
Daniel J. Jacavanco May 1965 14 p refs *Its* Phys. Sci. Res. Papers No. 105
(AFCRL-65-323; AD-616123)

Antenna patters (E-plane) of an X-band horn mounted in a ground plane and covered by a plasma slab were measured. A pulsed plasma was produced by capacitor discharge in a rectangular pyrex container of 6 in. × 2 in. × 24 in. i.d. Microwave interferometer measurements of the electron density were made at 9 and 35 Gc. Antenna patterns are presented which show a sharp decrease in radiated power at certain angles corresponding to the "optics critical angle (θ_c)". Good agreement is obtained for the movement of θ_c with plasma density. Author

N65-29111# Naval Research Lab., Washington, D. C.
STUDY OF WAVES IN A SMALL TANK
W. L. Roberts 29 Jul. 1964 refs
(NRL-6097; AD-604548)

With the use of relatively simple apparatus, precise measurements were made of wavelength and attenuation versus frequency of surface waves in the transition region between gravity waves and capillary waves. Wave velocities were determined by measuring the wavelengths in photographs of the water surface. The effects of contamination velocity and attenuation were determined. The effect of a current flowing perpendicular to a capillary wave system was studied photographically. Below a surface velocity of 6 centimeters per second, the cross current has little effect on wave structure. In the velocity range from 6 to 10 centimeters per second severe distortion of wave shape, and even destruction of the entire wave train, may result. The attenuation with distance of the wave amplitudes was measured for wavelengths from 0.75 to 4 centimeters. The measured values of attenuation in this wavelength range, obtained with distilled water and a clean surface, are only 6 percent more than the theoretical values. Tap water gave values as much as a factor of five larger than the theoretical values. Author

N65-29139*# Westinghouse Electric Corp., Baltimore, Md. Defense and Space Center.
LINEAR S/N SUMMER NOISE POWER DENSITY TEST RESULTS, APPENDIX C Final Report
J. L. Sundry and G. S. Entwistle 22 Mar. 1965 40 p Prepared for JPL
(Contracts NAS7-100; JPL-950144)
(NASA-CR-63905) CFSTI: HC $2.00/MF $0.50 CSCL 09C

The noise spectral density was tested by translation of the noise power to video by multiplying the noise with a stable reference frequency in a phase detector. The translated bandwidth was accurately established by a 3-pole, low pass filter. The filter noise voltage was sampled at 1000 samples/sec, converted to a digital number, and computer processed. The 50 kc results show evidence of a hump of about 0.40 dB in the spectral density, due to the noise generator, cable matching, or drift in the noise amplifier frequency response, while the 5 kc and 500 cps results show only random variation and no definite spectral tilt. However, all measurements fall within the limit of ±0.05 dB. E.E.B.

N65-29140*# Westinghouse Electric Corp., Baltimore, Md. Defense and Space Center.
LOCKED OSCILLATOR PHASE MODULATOR, APPENDIX D Final Report
G. R. Vaughan, E. F. Osborne, and G. S. Entwistle 25 Aug. 1964 137 p Prepared for JPL
(Contracts NAS7-100; JPL-950144)
(NASA-CR-63906, Append. D) CSCL 17B

Pertinent specifications for establishing phase modulator requirements are analyzed, and design objectives are tabulated for loop characteristics, voltage controlled oscillator, phase detector, dc amplifier, loop filter, feedback frequency divider ratio, and estimated transport lag around the loop. Studies on loop design and circuit implementation, and solutions to mechanization problems are also presented in detail. These analyses established design parameters permitting linear phase modulation (PM) of a locked oscillator by complex video signals. A block diagram shows how the driving signal is summed with the phase error to deviate the locked oscillator, thereby producing a PM outout at the carrier frequency. It was demonstrated that the system is feasible if (1) a phase detector having linear sawtooth characteristics is used; (2) the linearity and time constant of the deviable oscillator is adequate; (3) a count-down frequency divider is used in the feedback channel to compress the wide phase deviation required within the linear range of the phase detector; and (4) the linearity and frequency response of all loop components can be fabricated to the required accuracy. M.G.J.

08 COMPUTERS

Includes computer operation and programming; and data processing. For basic research see: 19 Mathematics.

N65-27980 Joint Publications Research Service, Washington, D. C.
THE MATRIX METHOD OF MINIMIZATION OF MICROPROGRAM SYSTEMS
V. G. Lazarev *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 48–57 refs (See N65-27975 17-34) CFSTI: $6.00

A procedure is investigated for minimization of systems of microprograms based on the matrix method of minimization of the number of internal states of a finite automaton. Author

N65-27982 Joint Publications Research Service, Washington, D. C.
ON OPTIMAL SYNTHESIS OF FORMAL NEURONS
I. B. Gutchin and A. S. Kuzichev *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 64–78 refs (See N65-27975 17-34) CFSTI: $6.00

Procedures are investigated for optimal synthesis of formal neurons with respect to the threshold diagrams which give them. Examples are presented which are solved using a computer, and an analysis of the results obtained is offered. Author

N65-27983 Joint Publications Research Service, Washington, D. C.
ON ENCODING OF INTERNAL STATES OF A FINITE AUTOMATION
Ye. I. Piyl' *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 79–90 refs (See N65-27975 17-34) CFSTI: $6.00

A procedure is discussed for encoding internal states of a finite automaton which permits elimination of intolerable states of the memory elements and simplification of the diagram of the combination part of the automaton. Author

N65-27985 Joint Publications Research Service, Washington, D. C.
ON THE PROBLEM OF VOLUME OF MEMORY OF A LEARNING AUTOMATON OF THE TABLE TYPE
E. K. Letskiy *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 102–111 refs (See N65-27975 17-34) CFSTI: $6.00

The problem of selection of size of a table for accumulation of information is investigated for current improvement of some function represented in table form and relating the input controlled and controlling parameters of the process. As a criterion for selection of the size of the table (or memory volume) the minimum average modulus of error in determination of the value of the control parameter is used. Investigation is done for the simplest algorithm for accumulation of information used in a learning automaton of the table type ATT-2 M. Author

N65-28002 European Organization for Nuclear Research, Geneva (Switzerland).
PROGRAMMING FOR FLYING SPOT DEVICES
W. G. Moorhead and B.-W. Powell, ed. 26 Mar. 1965 341 p refs Proc. of a conf. held at Bologna, 7–9 Oct. 1964; Sponsored jointly by I.N.F.N. and CERN
(CERN-65-11)

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N65-28003 Argonne National Lab., Ill.

LIST PROCESSING TECHNIQUES IN THE AUTOMATIC ANALYSIS OF SPARK CHAMBER DATA

R. K. Clark *In* CERN Programming for Flying Spot Devices 26 Mar. 1965 p 15–23 refs Sponsored by AEC (See N65-28002 17-08)

Described is a method of reconstructing spark chamber phenomena from three dimensional data. Proposed is the use of a graph for describing any event in a spark chamber, whose connected components are circuit free, and where: (1) the vertices of the graph are given by the points at which the paths of the particles have been recorded (the locations of sparks); and (2) the edges of the graph are the unobserved portions of the trajectories between two vertices, and an edge can be interpreted as a line in space joining two vertices (sparks). Reconstruction of the descriptive graph on its known set of vertices by determining the proper edges solves the reconstruction problem. S.C.W.

N65-28004 European Organization for Nuclear Research, Geneva (Switzerland).

THE AUTOMATIC ANALYSIS OF 200,000 SPARK CHAMBER PICTURES USING THE CERN HPD

P. M. Blackall, B. W. Powell, and P. Zanella *In its* Programming for Flying Spot Devices 26 Mar. 1965 p 25–33 refs (See N65-28002 17-08)

This paper describes in general terms the methods used to automatically scan and measure the photographs from a spark chamber experiment. The pictures were scanned using the CERN Mark I HPD, operating on-line to the IBM 7090 computer. The program processed each event up to the stage of completing the geometrical reconstruction in space concurrently with the measuring process. In addition to an important gain in speed over the hand analysis, it is also shown that the automatic measurements were more precise and more complete than the hand measurements. The reliability of the automatic scanning procedure is also discussed and results of a comparison with hand scanning are given. Author

N65-28005 Argonne National Lab., Ill.

A PROGRAM FOR CALIBRATING THE FLYING SPOT CATHODE RAY TUBE FOR CHLOE

R. J. Royston, J. Butler, and P. Pennock *In* CERN Programming for Flying Spot Devices 26 Mar. 1965 p 35–41 Sponsored by AEC (See N65-28002 17-08)

The flying spot cathode ray tube in CHLOE is calibrated by scanning a suitable photograph which is also measured on an accurate conventional measuring table. The type of photograph suitable for this application differs from that which is used for calibrating a conventional table and the considerations which lead to its choice are discussed. The CHLOE output is then processed by a program which identifies and measures the position of the calibration marks. These are then compared with their true measured positions and a correction function is computed by means of a fitting procedure. Author

N65-28006 Argonne National Lab., Ill.

AUTOMATIC ANALYSIS OF PHOTOGRAPHIC DATA IN BIOLOGY

J. W. Butler, Margaret K. Butler, and Agnes Stroud *In* CERN Programming for Flying Spot Devices 26 Mar. 1965 p 43–56 refs Sponsored by AEC (See N65-28002 17-08)

Described is a digital procedure for use in the automatic analysis of biological photographic data, which was designed to eliminate the time-consuming nature of laboratory experiments. Presented are experimental results of an automatic analysis of photographs of chromosomes obtained during the metaphase stage of mitotic division. The objective of the computer programs was to automatically make the necessary measurements and pair each chromosome with its companion on the basis of shape similarity. Described are the sequence of operations in the procedure, the scanning equipment, and the overall structure of the computer programs. Included are photographs of digitally reconstituted chromosomes from a pig's kidney, and other photographic data which serve to illustrate the effectiveness of the procedure. S.C.W.

N65-28007 European Organization for Nuclear Research, Geneva (Switzerland).

SPARK CHAMBER PHOTOGRAPH ANALYSIS USING LUCIOLE

A. E. Head and J. A. Wilson *In its* Programming for Flying Spot Devices 26 Mar. 1965 p 57–69 refs (See N65-28002 17-08)

Presented are results of an experimental analysis of spark chamber photographs which were measured by LUCIOLE, a

cathode ray tube flying spot digitizer. The first spark chamber experiment selected for data analysis by LUCIOLE was a hyperon missing mass experiment. The reactions studied were those arising from an incident π-beam hitting a liquid hydrogen target. The momentum of the incident beam was varied from 1.1 GeV/c to 2.75 GeV/c. The reactions considered were:

$$\pi^- + p \rightarrow Y^-(\Sigma^-, Y^{*-}, \ldots) + K^+$$

$$M^-(\pi^-, \rho^-, \ldots) + p$$

Presented are comparative data for the mass of the Σ^- as obtained from measurements using a digitized projector, and from LUCIOLE. The resonance was at 1196 MeV; the interval was 5 MeV. Measurements were made on the same roll of film, although only part of the roll was measured on the digitized projector. Preliminary results, based on a small sample, indicated less precision in the LUCIOLE measurements than in the digitized projector. As LUCIOLE results did not include the corrections for the systematic errors, further analysis is in progress to determine whether the complete system is verified. S.C.W.

N65-28008 European Organization for Nuclear Research, Geneva (Switzerland).
PROGRAM DEVELOPMENTS IN THE CERN FSD SPARK SYSTEM
P. M. Blackall and P. Zanella *In its* Programming for Flying Spot Devices 26 Mar. 1965 p 71–79 refs (See N65-28002 17-08)

Program developments for the automatic analysis of a second spark chamber experiment using the HPD flying spot digitizer are described. The objectives of the program focus on the development of greater accuracy in measurement and shorter analysis time. The primary differences between this program and the previous spark chamber experiment analyzed on the HPD are: (1) the number of digitizings is increased by a factor of 3 to 4, (2) tracks are nonlinear and are complicated by magnetic and electric field staggerings, (3) events are more complex, and (4) films are prescanned. Reactions of the following types are being studied:

$$(1)\ K^- + p \rightarrow \overline{K}^0 + n \qquad \text{at 9.5 GeV/c}$$

$$(2)\ \pi^- + p \rightarrow K_1^0 + K_1^0 + n \qquad \text{at 9.5 GeV/c}$$

Photographic data showing two K_1^0 meson decays from the reaction type are presented. About 800 events of this type have been photographed together with 500 events of type-1. Preliminary results indicate that the system is satisfactory.
S.C.W.

N65-28009 Brookhaven National Lab., Upton, N. Y.
THE STATUS OF HPD PROGRAMS AT BROOKHAVEN NATIONAL LABORATORY
K. Abrams, J. Cockrill, P. Connolly, D. Crennell, P. Hough et al *In* CERN Programming for Flying Spot Devices 26 Mar. 1965 p 97–113 (See N65-28002 17-08)

Presented is a description of the HPD (Hough-Powell Digitizer) system for rapid processing of bubble chamber pictures. Emphasized is the software, which runs on the IBM-7094 and CDC-924 computers, and experience gained from the first production running of the system. Data are organized into seven sections. Section I contains a general description of the whole HPD system as it is applied to an experiment. Picture quality requirements, event processing rates, and event rejection percentages, are reported. Sections II, III, and IV, contain detailed discussions of the road making operation, the FSD (flying spot digitizer) measurements, and the kinematics and event selection. Section V contains a description of the FSD control program called HAZE. The use of FSD measured bubble density to compute the best event interpretation and/or interpretations is presented in Section VI. In Section VII future plans for the HPD system are presented.
S.C.W.

N65-28010 European Organization for Nuclear Research, Geneva (Switzerland).
CERN VERSION OF FILTER
W. Krischer, W. G. Moorhead, and P. Seyboth *In its* Programming for Flying Spot Devices 26 Mar. 1965 p 115–121 ref (See N65-28002 17-08)

Described is a CERN FILTER routine of about 2000 FAP instructions. The purpose of FILTER is: (1) to compute the road parameters used by GATE (i.e., at the beginning of each slice the starting y-value, starting tangent, tangent increment per scan line, bin-width, and road-width; (2) to improve the road parameters, using information already gathered along the road; (3) to separate interesting tracks from background and other tracks; and (4) to compute master points for the CERN spatial reconstruction program. Flowcharts of the routine are included.
S.C.W.

N65-28011 European Organization for Nuclear Research, Geneva (Switzerland).
EXPERIENCE WITH THE CERN HAZE PROGRAM
J. M. Howie *In its* Programming for Flying Spot Devices 26 Mar. 1965 p 123–137 ref (See N65-28002 17-08)

Presented is an analysis of several results obtained from measurements of bubble chamber photographs on the Hough–Powell Digitizer (HPD). Discussed are the primary developments of the HAZE program. The interactions studied were anti-proton plus proton combining to produce a combination of protons, anti-protons, and positive and negative pions, sometimes together with one or two neutral particles. Examined are the success of the HPD measurements, comparative results obtained from IEP and HPD measurements of a sample of 68 four-prong events, the degree of error associated with each method, and the consistency of HPD and IEP measurements.
S.C.W.

N65-28012 European Organization for Nuclear Research, Geneva (Switzerland).
THE POST FILTER ROUTINE OF CERN HAZE
H. Hanerfeld and J. Seyerlein *In its* Programming for Flying Spot Devices 26 Mar. 1965 p 139–143 Prepared jointly with Max-Planck-Inst. für Phys. und Astrophys. (See N65-28002 17-08)

A routine designed to increase the accuracy of tracks reconstructed by THRESH from HAZE output, and to enable THRESH to calculate those tracks (short) for which FILTER found only one or two average points, is described. The working medium of the routine is a number of digitizings which have been kept by GATE under control of FILTER. The routine is divided into five sections, which are called Phase-1, Phase-2, two point routine, one-point routine, and exit routine. The course of action is determined by the number of average points found by FILTER. A brief discussion of each section is included.
S.C.W.

N65-28013 European Organization for Nuclear Research, Geneva (Switzerland).
THE FORTRAN DIAGNOSTIC ROUTINE USED WITH CERN HAZE
M. L. Luvisetto *In its* Programming for Flying Spot Devices 26 Mar. 1965 p 145–151 (See N65-28002 17-08)

A description of the FORTRAN diagnostic routine which was used with the GATE routine of CERN HAZE is presented. The following is a brief synopsis on the main characteristics of the diagnostic routine: The track information resulting from the GATE and FILTER operations is stored in a block called BUFB (about 60 words × 16 tracks). Each time a slice is filtered FILTER calls MONIT, a routine which writes onto tape the contents of BUFB for that track. This tape is the input to the FORTRAN diagnostic routine which reorders the data to give an ordered output for checking FILTER operation. The tape consists of a sequence of variable length records, each type of record being named and distinguished from the others by means of the contents of its first word, which must be one of the following octal numbers: 11000, 12000, 13000, 134000, 14000. The diagnostic program also needs control cards which provide a means to select events. The program has been used for HAZE off-line runs since the processing will not keep up with the input of digitizings from the HPD on-line if many records have to be written on tape, as well. The time required to process one event in one view is approximately 20 seconds.
S.C.W.

N65-28014 Columbia Univ., New York.
PRELIMINARY REPORT ON AN "INTEGRAL" FILTER TECHNIQUE FOR THE HPD
N. Webre, D. Burd, L. Garder, D. Tycko, and B. Zaslavsky *In* CERN Programming for Flying Spot Devices 26 Mar. 1965 p 153–172 refs (See N65-28002 17-08)

Described is a new filter method for the HAZE program which using conformal mappings. The method was designed to eliminate high rejection rates by condensing the contents of the roads into smaller numbers of words which could be saved, so that more powerful techniques might be applied at the end of the scan than could be used in real time. Included are data on the techniques employed in condensing the road data, the transformation and filtering, and data on error propagating of the points and tangents. Presented are experimental results of an analysis of roads data rejected from the HAZE program which uses Filter-II.
S.C.W.

N65-28015 Gt. Brit. National Inst. for Research in Nuclear Science, Chilton. Rutherford Lab.
HPD PROGRAMMING AT THE RUTHERFORD LABORATORY
J. W. Burren, J. W. Gardner, M. J. Mitchell, and M. C. Turnhill (Imperial Coll. of Sci. and Technol.) *In* CERN Programming for Flying Spot Devices 26 Mar. 1965 p 173–181 refs (See N65-28002 17-08)

An analysis of procedures used in reprogramming the track following methods for the Orion computer is presented. The program is written in FORTRAN apart from the Gating subroutine and some of the service routines which are in machine code. Also included is a discussion of programming improvements among which are noted the use of the picture concept to produce variable slice lengths for tracks, the picture slice to control the starting and the ordering of roads, and separate blocks of identical coding for each of the current roads to save time in the gating subroutine. The program was tested on a sample of 20 events measured on the CERN HPD (Hough–Powell Digitizer) together with rough digitizings of the events from the CERN Milady. The events were a mixture of K^- at 3.5 GeV/c and K^+ at 3.0 GeV/c from a run in the 80 cm hydrogen chamber. The events were mainly two prong with one V. The total number of tracks was about 100. Results obtained were encouraging. Inherent problems associated with highly curved tracks with changing radii and the problem of continuity of tracks are discussed. Tidying operations to deal with short tracks and to decide which track to take in the case of more than one track, are also discussed.
S.C.W.

N65-28016 College de France, Paris. Lab. de Physique Nucleaire.
RESULTS OBTAINED WITH AN OFF-LINE HPD SYSTEM
M. Bloch, M. Schiff, and C. de la Vaissiere (Inst. du Radium) *In* CERN Programming for Flying Spot Devices 26 Mar. 1965 p 183–206 refs (See N65-28002 17-08)

Reported are results obtained with an off-line HPD (Hough–Powell Digitizer) data reduction system. The content of the program is outlined in flow charts which describe respectively the treatment of an event in one view, the treatment of one track, and the treatment of one segment of track. The program was run as a single package on real data with a CDC-3600. The saving obtained by packing and pregating the HPD digitizings was studied. The input was found to be limited by decoding of the digitizings rather than by the read-in time. By making the decoding time match the reading time, the overall time can be reduced by about 30%. An analysis of various modes of searching for a fiducial showed that of 21 fiducials, 20 were located in the coarse mode and all were located in the final mode. Methods used to locate fiducials were safe and accurate. Two types of difficult cases were encountered during the search for tracks. These are discussed in view of their importance to the procedure. Using the display of summary points, it was found that the program provided an accuracy close to that permitted by the natural width of the track. Also included is a review of the principles of the system, and a discussion of the advantages and disadvantages of being off-line. All parts of the program are in Fortran and little effort was made to save time.
S.C.W.

N65-28017 College de France, Paris.
CONTROL OF THE HPD BY A SMALL COMPUTER
Ph. Leblond *In* CERN Programming for Flying Spot Devices 26 Mar. 1965 p 207–218 refs (See N65-28002 17-08)

Presented is an analysis of the College de France system which operates in two stages: the first stage operates essentially as a film digitizer with a magnetic tape output; the second stage is a program for a large computer which uses this magnetic tape output to reconstruct the events. Emphasized is the first stage which incorporates a small computer which controls the measurement and performs a certain amount of coarse gating on the co-ordinates before recording them. This gating involves only the simplest logical operations and reduces the amount of data by a factor of about four. Control of the HPD (Hough–Powell Digitizer) is achieved by the 160A in the following manner: first the computer selects the control interface in one of three modes: The film mode, the measurement mode or the status request. In the first two cases the computer sends a command in the form of a 12 bit word. Transfer of coordinates to magnetic tape is done during the second phase by the measurement routine. Protection against buffer memory overflow is achieved by means of a safety valve which has been built into the system. Also cited are proposals for minimizing the problem of controlling output quality. Although this method increases the amount of manual data handling, it has the advantage of simplifying the overall HPD system, both for the electronic equipment and the programs involved.
S.C.W.

N65-28018 European Organization for Nuclear Research, Geneva (Switzerland).
PRELIMINARY RESULTS ON HPD IONIZATION MEASUREMENTS AT CERN

L. Michejda *In its* Programming for Flying Spot Devices 26 Mar. 1965 p 219–227 refs (See N65-28002 17-08)

Presented is an analysis of procedures used in bubble density evaluations and the application of ionization information in identification of bubble chamber events. Considered are the programs initiated at CERN which deal with ionization information. In HAZE, ionization as seen in the film is evaluated, as well as its external and internal errors. An empirical correction (~30%) is applied for hits which were lost during the digitizing and filtering processes, and slices for which the measured values of ionization differ by too much from the mean value are rejected. Ionization is computed by solving the following equation:

$$\sum_i \frac{M_i}{\cos\alpha_i} = \sum \frac{H_i}{\cos\alpha_i} \frac{1}{\exp(k_a/\cos\alpha_i) - 1}$$

In the geometrical reconstruction program THRESH, the bubble density in space is computed as a weighted mean of the corrected bubble densities measured in three views. After applying two geometrical corrections, the corrected mean values, their errors, and geometrical corrections are passed through the kinematical program GRIND, and in a sub-routing JUDGE of the program BAKE, they are used to identify the events. The programs were tested using 15 four-prong interactions of 5.7 GeV/c antiprotons in the Saclay-81 cm HBC. Presented are preliminary results of these measurements.

S.C.W.

N65-28019 Pennsylvania Univ., Philadelphia.
HPD PROGRAMMING AT THE UNIVERSITY OF PENNSYLVANIA
J. D. Engman *In* CERN Programming for Flying Spot Devices 26 Mar. 1965 p 229–236 (See N65-28002 17-08)

Presented is a discussion of HPD (Hough–Powell Digitizer) programing plans which are being developed for future studies. Cited are plans to modify the present HAZE program to process 70 mm film taken at the BNL 80 inch bubble chamber; and plans to analyze photographs from a 2 GeV p_0 resonance study, on the BNL 20 inch chamber, 200000 pictures, as the first production run on the HPD. Conversion of the basic BNL HAZE program to the 7040, as set up for the BNL 20 inch chamber format, has beem completed and the program has been debugged using tapes of HPD digitizings from BNL. A HPD diagnostic program is presently being written which is based on the CERN PAN3, but extended to evaluate digitizings from special test film strips. To facilitate programing for the HPD by other groups, a series of macros have been written which will set up the proper calling sequences for the HPD commands. The use of a video gating scheme which would permit the specification of up to 8 roads is being considered. Included is a short review of the order of codes built into the Pennsylvania HPD. S.C.W.

N65-28020 Brookhaven National Lab., Upton, N. Y.
CURRENT STATUS OF THE DIGITAL AUTOMATIC SCANNING PROGRAMS
R. B. Marr *In* CERN Programming for Flying Spot Devices 26 Mar. 1965 p 237–258 refs Sponsored by AEC (See N65-28002 17-08)

Presented is an analysis of research related to the digital automatic scanning programs being conducted at Brookhaven and Berkeley laboratories. Emphasized are the following programs which are being developed independently: the track reconstruction phase which is designed to operate in real time during the FSD scan, and which has as its objective the reconstruction, in as complete a form as possible, of all particle tracks; the track-editing phase (called track linkage at Berkeley) which checks for spurious or incomplete track segments and takes appropriate corrective action; and the vertex recognition phase which encompasses rudimentary scanning operations, thus resulting in the listing of all possible vertex candidates recognizable in a single view. These various phases currently exist as separate IBM-7094 programs, interfaced via magnetic tape. Presented are comparative data on the general organization of the programs and the principal features of the basic design. Also included is a review of succeeding stages of processing which focuses on the merging of data from different views, and the recognition of preselected types of events. S.C.W.

N65-28047# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
COMPUTER TECHNOLOGY Selected Articles
7 May 1965 48 p refs Transl. into ENGLISH from Vychislitel'naya Tekhn. (Moscow), no. 3, 1963 p 74–90, 103–121
(FTD-TT-65-108/1+2; AD-616269)

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N65-28048 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE PARAMETRON—AN ELEMENT IN DIGITAL COMPUTERS
L. M. Asoyan *In its* Computer Technol. 7 May 1965 p 1–23 refs (See N65-28047 17-08)

The principles of the parametron and its applications in digital computers are explained. The parametron is a resonance network with a periodically varying parameter of the reactive element. Such a system is created by pumping into an electrical network to affect variation in capacitance or inductance, resulting in parametric excitation of the oscillations. Circuits based on parametrons contain only passive elements, so that it is a highly dependable, long-lived, and inexpensive element. When parametrons are used in computers, numerous advantages over use of other switching elements are noted. The Japanese M-1 computer, based on parametrons, has shown high performance. Fundamental properties of parametric oscillations, the operating principle of the parametron, variable-inductance parametron, multihole ferrite parametron, magnetic film parametron, three-cycle and two-cycle methods of driving parametrons, and the construction of parametron logic circuits are discussed. J.M.D.

N65-28049 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CERTAIN PROBLEMS IN THE INVESTIGATION OF THE PARAMETRON
L. M. Asoyan and M. G. Gevorkyan *In its* Computer Technol. 7 May 1965 p 24–46 refs (See N65-28047 17-08)

Various properties of the parametron are presented in the form of theoretical calculations. Topics of investigation are specifications for core material in logic circuits, calculation of parametron driving current, two methods of finding the operating current, reduction in power consumed by a parametron using two cores by reducing the dimensions of the cores, determination of the parameters of the parametron resonance

network, calculation of the parameters of the coupling transformer which connects separate parametrons, derivation of the largest number of parametrons that can be connected at the output of a control parametron and the largest number of input signals that can be connected at the input to a parametron, and determination of the rise and fall times of the subharmonic oscillations in the parametron. J.M.D.

N65-28113# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON A NEW METHOD OF ADDING AND SUBTRACTING BINARY NUMBERS ON HIGH SPEED DIGITAL COMPUTERS

V. V. Chavchanidze, I. N. Bukreyev et al 23 Jan. 1965 15 p Transl. into ENGLISH from Tr. Inst. Fiz., Akad. Nauk Gruzin. SSR (Tiflis), no. 8, 1962 p 313–321
(FTD-TT-64-837/1+2; AD-610787)

A new algorithm of addition and subtracting of binary numbers is given in the article. It consists in the preliminary layout of orders of mantissas of the initial pair of numbers into special groups of orders and in the successive operation according to two different rules without any carries. This method of addition and subtraction has some advantages: some possible increase of the accumulator quick-response at the corresponding realization of the line making the layout, then the possibility of operation only in direct code and some others. The algorithm itself is also useful for calculators and programmers who make binary operations on paper. Author

N65-28122# Naval Ordnance Lab., White Oak, Md.

FORTRAN IV (IBM 7090) PROGRAM FOR THE DESIGN OF CONTOURED AXISYMMETRIC NOZZLES FOR HIGH TEMPERATURE AIR

Walter J. Glowacki Jul. 1965 80 p refs
(NOLTR-64-219; Aerodynamics Res. Rept.-235; AD-465605)

A computer program is presented for designing contoured axisymmetric nozzles when the supply air temperature is high enough to produce real gas effects. The real gas properties of high temperature air in thermodynamic equilibrium are computed using empirical equations and assuming that the air undergoes an isentropic expansion. These properties are used to determine the potential core contour by solving the inviscid flow equations by the method of characteristics. The turbulent boundary layer growth is computed from a numerical integration of the momentum integral equation and is added to the potential core to obtain the nozzle contour. The heat transfer rate is calculated from a form of Reynolds analogy. The computer program covering these phases of nozzle design is presented with the instructions necessary for using it. Author

N65-28148# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.

THE APPLICATIONS OF COMPUTERS TO THE APL STORAGE AND RETRIEVAL SYSTEM

F. L. Kennedy and M. E. Brown Mar. 1965 25 p refs
(Contract NOw-62-0604-c)
(APL-TG-669; AD-462339)

An information retrieval system has been developed that can be used either with an IBM 1401 or a 7090 computer. Details are given on the cataloging procedures, methods of selecting descriptors, and search techniques. Features of the system as applicable to the two computers are compared. Author

N65-28150# Aberdeen Proving Ground, Md. Ballistic Research Labs.

THE FORAST PROGRAMMING LANGUAGE FOR ORDVAC AND BRLESC (REVISED)

Lloyd W. Campbell and Glenn A. Beck Mar. 1965 143 p refs Supersedes BRL-1172
(BRL-1273; BRL-1172; AD-465805)

FORAST is a procedure oriented programming language designed for use on the ORDVAC and BRLESC computers at BRL. Although it was designed for professional programmers, FORAST contains sufficient simple concepts to make it usable by a novice or journeyman. It permits the use of arithmetic formulas, some English word statements, and each computer accepts its own symbolic or absolute machine language. The latter feature permits the professional programmer to use the full power of each computer. Author

N65-28163# Illinois Univ., Urbana. Radiolocation Research Lab.

THE ACQUISITION OF ANALOG DATA IN A DIGITAL FORMAT Technical Report No. 25

David A. Preves Dec. 1964 61 p refs
(Contract Nonr-1834(02))
(RRL Publ.-265; AD-610775)

A data acquisition system is described which is capable of (1) collecting the contents of one to six channels of analog data at the source, (2) digitizing the contents of each channel, and (3) storing the digitized data on magnetic tape in a format that is compatible to the input units of the computer to be used for analyzing the data. The specifications for the system are listed. The system is quite flexible as a result of (1) the variable data collection rates, (2) the two methods by which acquisition cycles may be initiated, (3) the simultaneous and individual methods of collecting the data, (4) the modes of operation: internal, intermittent, external, and start-stop, and (5) the capability of expanding the system to meet future requirements. The analog inputs may be the output of any voltage-producing transducer whose output lies within the input voltage range and frequency range of the system. N.E.A.

N65-28226# Sylvania Electric Products, Inc., Waltham, Mass. Display and Instrumentation Lab.

AN ELECTROLUMINESCENT CROSSED-GRID DISPLAY Final Report, 4 Jun. 1963–4 Jun. 1964

Joseph Hallett Griffiss AFB, N. Y., RADC, Mar. 1965 82 p
(Contract AF 30(602)-3081)
(RADC-TDR-64-362; AD-615505)

The organization and performance of an electroluminescent crossed grid display system has been studied and an experimental model has been constructed demonstrating the basic concepts developed during the study. This work is based on using a display panel that does not have integral storage; thus a buffer memory is included to minimize the load on the computer data-source, and to periodically refresh the displayed information. It is indicated that an image-organized magnetic core memory is most suitable for this system. Both semiconductor and magnetic circuits were investigated for driving the display, and magnetic circuits were found to provide superior performance and advantages. An improved technique for display panel construction permits construction of a large display surface from a number of individual modules. The experimental model has an 8 by 8 inch display with 16 line per inch resolution. An entire image may be erased and replaced with an entirely new image in less than one frame (1/30 second). Brightness is about .8 footlamberts for an average contrast ratio of about 20:1 and is independent of the density of displayed information. The techniques used are compatible with future use of light amplifiers or improved EL materials to provide increased brightness. Author

N65-28265 Joint Publications Research Service, Washington, D. C.

AN ELECTRONIC COMPUTER FOR ACOUSTIC CORING

V. B. Smolov and E. P. Balashov *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 105–111 ref (See N65-28250 17-10) CFSTI: $5.00

We describe a digital-analogue computing device used in geological-prospecting work. We assume as the basis for the instrument's operation the method of numerical integration by the Euler formula. The schematic diagram of the instrument, completed with semiconductor elements, is presented. Author

N65-28459*# Marquardt Corp., Van Nuys, Calif.

INSTRUCTIONS FOR THE USE OF THE MARQUARDT IBM 7040 COMPUTER PROGRAM. CONTROLLED TETHERING IN SPACE

D. P. Muhonen 29 Jan. 1965 14 p *Its* Rept.-6091 (Contract NAS1-3912)

(NASA-CR-63851) CFSTI: HC $1.00/MF $0.50 CSCL 09B

A computer program was designed to simulate the motion of an orbiting system of three bodies by two elastic tether lines. The space vehicle is assumed to have a distributed mass and therefore nonzero dimensions and moments of inertia. The astronaut and anchor are simulated as point masses. The system contains 12 degrees of freedom consistent with constraints imposed by the connecting tethers. Provisions are made for the tether line reel-in and reel-out, and for maintaining a constant tension on the line. The computer deck is written in FORTRAN IV and MAP and is set up for use with IBSYS on the IBM 7040. The program input and output are in polar coordinates but because the analytical description is simpler, the computations are handled in Cartesian coordinates. The program logic consists of the solution of a set of simultaneous differential equations. The Adams-Moulton four point method is used in the numerical integration procedure, which provides for an estimation of local truncation error and allows the user to vary the integration step size as needed. R.N.A.

N65-28464*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

LOW-POWER, LOW LEVEL ANALOG-TO-DIGITAL CONVERTER FOR SPACE VEHICLE APPLICATIONS

John C. Sturman and Anthony V. Bertolino Washington, NASA, Jul. 1965 35 p refs

(NASA-TN-D-2916) CFSTI: HC $2.00/MF $0.50 CSCL 09B

Design considerations and a detailed circuit description are presented for a seven-bit analog-to-digital converter with a 20-millivolt full-scale input. The special significance of this design is the achievement of a power level of less than 10 milliwatts for the complete converter when operating at a 250-word-per-second conversion rate. The prototype converter is built by using relatively conventional components in welded cordwood modules; however, the design could be readily adapted for thin film or possibly integrated circuit fabrication. Author

N65-28555 Joint Publications Research Service, Washington, D. C.

HIGHLY DIRECTIONAL ANTENNAS WITH VARIABLE APERTURE AND SIGNAL PROCESSING AFTER FREQUENCY CONVERSION

Ye. A. Vorob'yev *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 44–50 refs (See N65-28550 17-09) CFSTI: $5.00

The feasibility of reducing the real level of side-lobe radiation from a highly directional antenna is analyzed with the dimensions or shape of the radiating aperture modulated in time and with the signal averaged after frequency conversion. in the case of averaging the 'instantaneous' patterns after conversion, the theoretical relations agree well with the calculated results. Author

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N65-28562 Joint Publications Research Service, Washington, D. C.

ENERGY SPECTRUM OF THE TWO DELAYING STOCHASTIC SIGNALS

V. I. Chaykovskiy *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 113–116 refs (See N65-28550 17-09) CFSTI: $5.00

The signal-to-noise ratio at the output of a receiver can be improved by adding two signals present in a stochastic noise background and shifted with respect to each other. The energy spectrum of noise at the output of a linear multichannel summator with delay was determined. In analyzing the results obtained, it was concluded that the energy spectrum at the output was considerably different from the input. For an input spectrum uniform over an infinite range, the output spectrum represents a periodic function whose generalized period is and whose maxima correspond to the frequencies O, π, 2π, etc. Those spectral components of the input signal which are not multiples of π become attenuated at a rate which increases with the number of channels. This characteristic makes it feasible to apply a linear multichannel summator system with delay for the purpose of suppressing noises at the receiver input. E.E.B.

N65-28565 Joint Publications Research Service, Washington, D. C.

METHOD AND TECHNIQUE OF INVESTIGATING EXPERIMENTALLY THE ANTI-INTERFERENCE STABILITY IN A SYSTEM OF AUTOMATIC FREQUENCY CONTROL BY PHASE

Yu. U. Ul'yanovskiy *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 129–133 refs (See N65-28550 17-09) CFSTI: $5.00

The anti-interference stability of an automatic phase control system was investigated to determine how the residual difference between the mean frequencies of the standard generator and the synchronizing generator varies at different values of initial detuning, at various values of the low-frequency filter time constant, and at various power levels of external fluctuation noises. An average function is obtained which relates these parameters

$$\frac{\omega - \omega_0}{\Delta} = f\left(\frac{\Delta_0}{\Delta}\right)$$

where the residual difference between the mean frequencies is given by $(\omega - \omega_0)$ and the initial detuning is Δ_0. Application of the method for investigating experimentally the anti-interference stability of an automatic phase control system has confirmed the theory and enabled the determination of the true value of $\omega - \omega_0/\Delta$ at large fluctuation noises and at initial detuning close to $\Delta_0/\Delta = 1$. E.E.B.

N65-28567 Joint Publications Research Service, Washington, D. C.

EXPERIMENTAL INVESTIGATION OF HIGHLY DIRECTIONAL ZONAL REFLECTING SYSTEMS PRODUCING FAN-SHAPED RADIATION PATTERNS

Ye. A. Vorob'yev *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 142–145 refs (See N65-28550 17-09) CFSTI: $5.00

Zonal reflecting antennas with rectangular apertures have excellent directional and focusing characteristics. The radiation patterns of the two principal orthogonal planes of such a system are shown. Also, the excellent focusing qualities of a zonal antenna with rectangular aperture are presented graphically. The gain measured by the method of substitution with a standard horn was 1100. The favorable features of zonal reflectors

with fan-shaped radiation pattern, together with satisfactory electrical characteristics, point toward the application of these systems as highly directional antennas in radar stations. E.E.B.

N65-28572 Joint Publications Research Service, Washington, D. C.
SLOTTED RADIATOR WITH POLARIZATION CONTROLLED BY A FERRITE
Yu. V. Shubarin and A. N. Magda *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 170–175 refs (See N65-28550 17-09) CFSTI: $5.00

One of the basic shortcomings of a slotted radiator with revolving polarization is the difficulty in regulating the polarization at a fixed frequency or to maintain a prescribed polarization within a range of frequencies. These adjustments can be realized by displacing the field pattern in the transverse waveguide cross section with respect to the center point of the slotted radiator by the use of a ferrite plate placed in the transverse premagnetizing field parallel to the narrow wall of the waveguide. By proper adjustment of the distance between the ferrite plate and the narrow wall of the waveguide, it is possible to obtain an almost linear relation between the ellipticity factor and the magnetic field intensity within a wide range of polarization control from linear to almost circular. E.E.B.

N65-28587# Joint Publications Research Service, Washington, D. C.
ANALOG COMPUTERS I
Gyorgy Balkanyi et al 12 Jul. 1965 16 p Transl. into ENGLISH from Elektrotechnika (Budapest), v. 56, no. 7–8, 1963 p 325–330
(JPRS-31037; TT-65-31595) CFSTI: $1.00

Basic principles of analog modeling are briefly reviewed, and the advantages of a mathematical model to describe and to solve a variety of physical stystems are pointed out. The design, programing, and use of the dc electronic analog computer in studying linear and nonlinear systems are discussed, with emphasis on its importance as a general purpose analog modeling tool. The requisites and characteristic data of dc operational amplifiers are summarized, and figures illustrate such fundamental mathematical operations as change in sign, summation, integration, differentiation, single storage hysteresis, and multiplication with constant factors. M.G.J.

N65-28618# Northwestern Univ., Evanston, Ill. Dept of Materials Science.
EVALUATION FROM X-RAY DIFFRACTION PROFILES OF FOURIER COEFFICIENTS AND THE MICROSTRAIN DISTRIBUTION FUNCTION
R. J. De Angelis (Kentucky Univ.) 10 May 1965 22 p
(Contract Nonr-1228(20))
(TR-6; AD-615327)

A mathematical technique for treating X-ray diffraction intensity profiles by Fourier coefficients is used to determine the distribution of microstrains in a deformed metal. A sufficient number of diffraction peaks from an isotropic material, or at least three orders of a single peak for an anisotropic material (more are even better) must be available. The Fourier cosine coefficients are separated into their strain and particle size components. For a cubic material, the strain component of the cosine coefficients is plotted against a series function, and the symmetry of the cosine function defines the remaining half of the curve. L.S.

N65-28659# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON THE SYNTHESIS OF CONTROL SYSTEMS FOR AN ELECTRONIC DIGITAL COMPUTER
N. G. Bruyevich 23 Apr. 1965 24 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Otd. Tekhn. Nauk: Energ. i Avtom. (Moscow), no. 4, 1961 p 93–108
(FTD-TT-64-785/1+2; AD-615215)

A proposed method of control systems for an electronic computer is presented. The proposed method of synthesizing, having selected a single address digital computer of parallel action with fixed comma, is examined in detail. Equations of control arrangement of a single address digital computer are given and schemes of control devices of a single address digital machine are presented. N.E.A.

N65-28846# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ITERATIVE TECHNIQUES FOR ESTIMATING THE PARAMETERS OF THE WEIBULL AND GAMMA DENSITY FUNCTIONS
George E. Hardy (M. S. Thesis) Aug. 1964 71 p refs
(GRE-64; AD-610769)

This thesis develops computer programs which solve for the estimators of the Weibull and Gamma density functions through iterative techniques. The maximum likelihood estimators are developed and the iterative techniques used for each density function are explained. The operating instructions for the programs are included with explanations for eliminating errors that might develop within the programs. The estimators developed for a large number of samples are included. A comparison is made between the results of each program and the results achieved by another estimation technique. Finally, there is a short discussion concerning the distributions of the estimators. Author

N65-28912# Burroughs Corp., Paoli, Pa. Defense and Space Group.
RADAR VIDEO DATA PROCESSOR Final Report
Dec. 1964 181 p refs
(Contract FA-WA-4693)
(SRDS-RD-64-128)

The design, fabrication, and acceptance testing of four radar video data processors (RVDP) are discussed. The RVDP uses sliding windows for statistical target detection of both search and beacon targets. It determines target position to an accuracy of 1/16 nautical miles in range and 0.088° in azimuth, and reports all detected target data once per antenna scan. Radar targets are detected by an advanced, double-threshold method, the first threshold controlling search radar video quantization to minimize the quantizing of noise as targets, the second threshold controlling target leading edge detection to reduce the number of false alarms due to clutter. A powerful, post-detection, garble-sensing technique determines the garble status of detected beacon reply code trains for all resolvable combinations of mixed replies. Beacon reply codes and search or beacon statistically derived target coordinates are combined into a single target report. E.E.B.

N65-28970# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHOD OF CHANGING OVER ANALOG VALUES TO A DIGITAL CODE

E. I. Shirits 27 Apr. 1965 5 p Transl. into ENGLISH from Soviet Patent No. 154447 (Appl. No. 763366/26-24, 10 Feb. 1962) 3 p
(FTD-TT-64-1279/1+2; AD-615291)

A method of converting analog values into a digital code is described. The slope of the saw-tooth voltage is varied a whole number of times, which is also a multiple of two after it has been compared with the voltage to be converted. The proposed method shortens the conversion time. R.N.A.

N65-29061# General Dynamics/Convair, San Diego, Calif.
OPTIMIZING TRAJECTORIES BY MEANS OF THE CALCULUS OF VARIATIONS Users Manual for Setting up OPTRAJ I
D. F. Meacock 31 Jan. 1965 12 p Supplement II
(GDA-63-0971, Suppl. II)

The method of setting up the object deck and input data cards of OPTRAJ I (optimizing trajectories by means of the calculus of variations) for minimizing flight time between given end conditions is described. The program is completely self-contained in that all subroutines are incorporated in the object deck and only input data are needed to make a run. The program can process multiple runs each having a maximum of 10 sections. R.N.A.

N65-29078# Navy Electronics Lab., San Diego, Calif.
MODIFICATION OF THIRD-OCTAVE DIGITAL ANALYZER (TODA)
R. E. Cruse 10 May 1965 22 p
(NEL-1286; AD-465367)

A modification of the Third-Octave Digital Analyzer (TODA) is described, and the redesign and installation of the replacement equipment for the digital portion was completed. The redesign features included semiconductor control circuits; data readout by means of punched cards with automatic reduction for any integration time, and data channels in use being read out; electronic programer and counter; automatic scan without punch; and error free manual operation. As a result, data process time has been reduced by 40%. Although manual editing of output data has not been eliminated, the use of punched cards has resulted in fewer corrections. Operational controls of the TODA are simplified, resulting in shorter set-up time, few operator errors, and reduction of down time through the use of more reliable components. W.M.R.

N65-29116# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ALGORITHM OF THE SYNTHESIS OF LOGIC CONVERSIONS, OPTIMUM WITHIN A GIVEN SET
E. A. Yakubaytis 13 Apr. 1965 17 p refs Transl. into ENGLISH from Tr. Inst. Elektron. i Vychislitel'noi Tekhn., Akad. Nauk Lat. SSR, v. 4, 1963 p 21–33
(FTD-TT-64-1143/1; AD-614951)

A procedure for the synthesis of logic elements with several input signals and one output signal is disscussed. The proposed method is convenient in the use of discrete computing machines. R.N.A.

09 ELECTRONIC EQUIPMENT

Includes electronic test equipment and maintainability; component parts, e.g., electron tubes, tunnel diodes, transistors; integrated circuitry; microminiaturization. For basic research see: 10 Electronics. For related information see also: 07 Communications and 21 Navigation.

N65-28116# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SELF-ADJUSTING SYSTEM OF AUTOMATICALLY CONTROLLING RELATIVE DAMPING COEFFICIENT
V. M. Kuntsevich 18 Jan. 1965 5 p Transl. into ENGLISH from Soviet Patent No. 154587 (Appl. No. 282844/26-24, 15 Jun. 1962) p 1–3
(FTD-TT-64-858/1+2; AD-610375)

A newly proposed self-adjusting system for automatically controling relative damping coefficient is described. The system contains the control object amplifier-transformer and test pulse generator. For continuous measurement of current value of relative damping coefficient, the amplifier-multiplier is included for the purpose of direct connection. The amplifier-multiplier is enveloped by direct connection, the circuits of which contain differentiating and integrating links connected to the multiplier of derivative values and integral from mismatching signal. N.E.A.

N65-28144# Tung-Sol Electric, Inc., Livingston, N. J. Chatham Electronics Div.
DEVELOPMENT OF A HIGH POWERED ELECTRON MULTIPLIER TUBE Quarterly Report, 15 Oct. 1963–15 Jan. 1964
J. Mc Artney and B. Carlat [1964] 22 p ref
(Contract Nonr-4323(00) (X))
(QR-1; AD-463035)

Design and development continued on a grid controlled secondary emission electron multiplier tube. Investigations were conducted on the average power capabilities of the USN-8455 tube, the maximum power and current densities permitted with oxidized silver magnesium dynodes, and methods of increasing heat dissipation. A tube capable of five times the average power rating of the USN-8455 was designed. R.N.A.

N65-28147# Inland Testing Labs., Dayton, Ohio.
QUARTZ CRYSTAL RELIABILITY STUDIES Seventh Quarterly Progress Report, 1 Jan.–1 Apr. 1965
Carleton E. Jones [1965] 40 p
(Contract DA-36-039-AMC-02350(E))
(Rept.-7; AD-465244)

The results of the 5000 hour reliability tests and subsequent temperature characteristic, shock, and vibration tests are presented. Author

N65-28149# Utah Univ., Salt Lake City. Microwave Device and Physical Electronics Lab.
MICROWAVE DEVICE AND PHYSICAL ELECTRONICS LABORATORY CONSOLIDATED QUARTERLY REPORT, JANUARY 1–MAR. 31, 1965
31 Mar. 1965 77 p refs
(Contracts Nonr-1288(05); AF 04(693)-439; AF 33(657)-8677; DA-039-AMC-02372(E); Grant NSF GK-29)
(MDL-Q12; AD-465082)

Research activity is reported on an effort to extend the useful frequency spectrum into the range from microwave frequency to optical frequencies and to improve existing devices and techniques in the microwave spectrum. This effort is being pursued by studies of electron beam devices, solid state devices, and plasmas. N.E.A.

N65-28155# Naval Ordnance Test Station, China Lake, Calif. Test Dept.
LINEAR ANALYSIS OF A DIGITAL HYDRAULIC SERVO SYSTEM WITH A RESONANT LOAD
T. W. Nickell Mar. 1965 51 p refs
(NOTS-TP-3777; AD-615338)

A resonant-loading term was added to the linear mathematical model of the digital hydraulic servo system and an analysis was conducted to determine its effect on the response of the system. This report outlines the analytical methods used and gives the results of the analysis. Author

N65-28159# Western Microwave Labs., Inc., Santa Clara, Calif.
DEVELOPMENT OF FOUR-BIT DIGITAL PHASE-SHIFTER Semiannual Report
Robert Addington Jan. 1965 42 p
(Contract AF 30(602)-3496)
(SAR-1; AD-610598)

Solutions to various problems in designing a ferrite four-bit digital phase-shifter were developed. Problems considered were the peak and average power handling capability, voltage-standard-wave-ratio for any phase-bit combination, latchable stripline construction operating on a major hysteresis characteristic, switching times of 10 microseconds or less, and elimination of the phase-length difference between the two paths of a ferrite junction allowing for small digital phase-bits. Circuit diagrams are given for different combinations of switchable and fixed bias junctions, for a partial ferrite junction, for a cascaded partial junction, and for a model of a driver. Curves of hysteresis loops are included. L.S.

N65-28195# Harry Diamond Labs., Washington, D. C.
TUNNELING JUNCTION DIODE PRESSURE GAUGE
Marvin M. Cohen and Leon Horn 5 Mar. 1965 24 p refs
(HDL-TR-1282; AD-615300)

Tunneling junction diodes, designed specifically for use as miniature pressure gauges, were fabricated from arsenic-doped germanium of resistivity 0.001 ohm-cm and tested under hydrostatic pressures up to 10,000 psi. These "flat" diodes differ from ordinary tunnel diodes in that the peak-to-valley ratio has been reduced to 1 or less by increasing the excess and diffusion currents with high temperature alloying and increased alloying times. A negative resistance region appears only at low temperatures. This type of flat-characteristic, two-terminal device is useful as a constant-current device when the peak-to-valley ratio is 1 and as a variable range pressure gauge when the peak-to-valley ratio is 1 or less by utilizing the pressure dependence of the tunneling current. Gauge factors of 350 were achieved and the change in "peak" current with pressure was shown to be comparable with that of Esaki diodes. Preliminary results are shown for a digital readout pressure transducer working from a tunnel diode oscillator. Author

N65-28225# Purdue Univ., Lafayette, Ind. Dept. of Physics.
SEMICONDUCTOR RESEARCH Semiannual Report, 1 Oct. 1964–31 Mar. 1965
[1965] 78 p refs
(Contract DA-31-124-ARO(D)-17)
(AD-615565)

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N65-28227# Army Electronics Labs., Fort Monmouth, N. J.
FACTORS INFLUENCING ULTRAHIGH VACUUM IN MICROWAVE ELECTRON DEVICES
Stanley Du Buske Jan. 1965 23 p refs
(ECOM-2571; AD-615449)

In microwave electronic device design, the residual gases problem is usually given secondary attention though its effects on device performance and reliability can be of primary importance. The initial effects of residual gases in complex microwave electronic devices can adversely affect the cathode emission, beam focusing, output power, noise level, and internal vacuum almost instantaneously. In addition, irreparable damage can be done to internal precision components which can result in the premature failure of the device. To attain and to maintain the ultra-high vacuum needed for optimum performance, long life, and high reliability demanded by modern technology of microwave electronic devices, a knowledge of the interactions of gases with solid surfaces is required. The problem of residual gases in microwave electronic devices is discussed with respect to Adsorption and Desorption and the Composition, Sources and Types of Residual Gases. Author

N65-28230# Air Force Cambridge Research Labs., Bedford, Mass. Optical Physics Labs.
NANOSECOND PULSES OF VERY LOW IMPEDANCE
Heinz Fischer Apr. 1965 16 p refs *Its* Instrumentation Papers No. 58
(AFCRL-65-219; AD-614900)

Nanosecond pulses exceeding 2000 A are obtained by discharging a plated-capacitor transmission line of very low impedance thru an air gap. High repetition rates exceeding 20 kc are possible, also triggered single shots with a time jitter of less than a nanosecond. A compact model of the pulser for operating a laser diode is described. Lower pulses covering a wide current range conveniently are produced by the same geometry, using a mercury wetted contact switch. Author

N65-28255 Joint Publications Research Service, Washington, D. C.
AN AMPLIFIER WITH SIMPLIFIED STABILIZATION FOR ELECTROMETER TUBES
V. G. Danilov and A. P. Orekhov *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 36–37 (See N65-28250 17-10) CFSTI: $5.00

Described is an amplifier in which stabilization of the input stages was achieved using a subminiaturized pentode. This resulted in an amplification factor of approximately 30 in the first stage, and reduced stability of requirements of all succeeding stages. The amplifier was designed with a 100% negative feedback, and all stages were assembled with balanced circuits. The amplifier was used to measure the currents of a radiofrequency mass spectrometer. Amplifier drift is not more than 3 millivolts/hour, five minutes after connecting. Sensitivity can be increased by changing the measuring resistance from 6.5 to 1000 gohm. S.C.W.

N65-28258 Joint Publications Research Service, Washington, D. C.
PROTECTING WAVEMETERS FROM OVERLOADS BY MEANS OF SILICON DIODES
A. V. Donskoy and V. V. Volodin *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 51–61 refs (See N65-28250 17-10) CFSTI: $5.00

Described are silicon diode current limiters for protecting the pointer units of resonance wavemeters used in the fields of powerful high-frequency devices. Presented are formulas for determining the electrical parameters of all elements of the wavemeter and diode circuitry. Included are diagrams of resonance wavemeters having one- and two-stage diode current limiters with a measuring device responding to the constant component of the signal, and with a measuring device responding to the variable component of the signal. Also discussed is the use of silicon stabilitrons for current limiting purposes. S.C.W.

N65-28275 Joint Publications Research Service, Washington, D. C.
THERMAL REGIME OF A POWERFUL PULSE TRANSFORMER
S. S. Vdovin *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 165–169 refs (See N65-28250 17-10) CFSTI: $5.00

The article examines the problems of selecting the optimum operating regime of a core in a powerful pulse transformer and its thermal load. It is shown that for a reduction of losses in the steel of the core with given distortions of the pulse, it is most advantageous to employ the regime of complete magnetic polarity reversal. Author

N65-28328# Raytheon Co., Burlington, Mass. Microwave and Power Tube Div.
HARMONIC AND SPURIOUS SIGNAL SUPPRESSION IN MAGNETRONS Final Report, Aug. 1963–Sep. 1964
Robert E. Edwards and Peter S. Bottorff [1964] 94 p refs
(Contract NObsr-89518)
(PT-882; AD-615387)

An investigation was conducted to determine the causes of spurious output signals from magnetrons. Several corrective measures applied to the RK6344A C-band magnetron resulted in reduction of second and third harmonic output, and of other spurious signals and background noise over a wide frequency range, of 20 to 45 db. Field evaluation of the revised tubes by the Navy confirmed that improved RFI performance had resulted from the design changes. The general characteristics of the spurious signal phenomena, the design techniques developed, and the recommendations for further studies in the field should be of use to magnetron designers in solving RFI problems. Many of the findings will be applicable to other microwave tubes. Utilization of the information already gained, and further pursuit of the field, will lead to fewer electronic interference problems in the field and to increased equipment reliability. Author

N65-28495 France. Ministère de l'Air, Paris.
ON THE STUDY OF A RECEIVER OF LOGARITHMIC RESPONSE IN PULSED MODES [SUR ETUDE D'UN RECEPTEUR A REPONSE LOGARITHMIQUE EN REGIME IMPULSIONNEL]
André Meesters Serv. de Doc. Sci. et Tech. de l'Armement, 1965 68 p In FRENCH
(NT-144)

Principle of a successive detection logarithmic amplifier is reviewed. A study of continuous mode: gain, pass band is given. Also given is a study of transitory modes: single stage transmission time, influence of the absorption created by the grill current. The effect of rapid variation of the grill current on single state pulse mode response and the adopted solution for its suppression are presented. An account is given of experimental performance. Trans. by J.G.

N65-28512# Compagnie Générale de Télégraphie sans Fil, Puteaux (France).
STRUCTURE AND ACTIVITY OF GAS ELECTRODES FOR O_2–H_2 [STRUCTURE ET ACTIVITE DES ELECTRODES A GAZ POUR PILES O_2–H_2]
H. Huber, R. Le Bihan, G. Feuillade, R. Coffre, B. Michel et al [1965] 22 p refs In FRENCH Presented at the Ann. Meeting Organized by the Gen. Delegation for Sci. and Tech. Res., Paris, Feb. 1965

Fused electrode studies form an important part of the work in fuel cell development. Improved electrode performance and reduction of cost is investigated from the points of view of modified geometrical structure and activation using less expensive catalysts. The methods are especially applicable to electrodes for medium power, low temperature cells. Some of the results obtained with metal oxide catalysts, however, have lead to development of a high temperature cell. In addition, in the low temperature regime another electrode model has been developed which has regular pores and which exhibits performance superior to fused electrodes. The study is divided into five reports concerning modification of fused electrode structure in order to reduce the amount of noble metal catalyst required, new catalysts, hydrogen–oxygen cells, kinetics of porous electrodes, and electrodes with regular pores. Trans. by E.W.

N65-28526# General Dynamics/Fort Worth, Tex. Nuclear Aerospace Research Facility.

SECOND TEST ON RADIATION EXPERIMENTATION FOR THE Q-FACTOR TECHNIQUE Technical Report, 1 Oct. 1964–1 Apr. 1965

B. E. Curtsinger and A. R. Robinson Kirtland AFB, N. Mex., AF Weapons Lab., May 1965 49 p refs
(Contract AF 29(601)-6643)
(FZK-224; AFWL-TR-65-18; AD-616000)

One hundred eighty transistors, four diodes, and two silicon solar cells were irradiated under closely controlled environmental conditions and bias levels. Data were taken on the transistors and diodes before, during, and after the irradiation. The information in this report describes the test setup and techniques and gives the dosimetry data. Author

N65-28529# Hughes Aircraft Co., Newport Beach, Calif. Electronic Products Div.

SSB AND VHF CRYSTAL FILTERS Quarterly Report, Dec. 15 1964–Mar. 15 1965

E. C. Ho and R. H. Tuznik [1965] 45 p refs
(Contract DA-36-039-AMC-02305(E))
(QR-7; AD-465127)

In this report the design, fabrication, and test results for the developmental ten-crystal bimotional crystal filter at 5.0 MC is presented and evaluated. Initial results from an investigation of temperature compensation of a ten-crystal intermediate filter design at 5 MC are presented. Factors involved in future investigations on temperature compensation are discussed. General considerations, specifications, design, theoretical performance, and test results on a four section quartz crystal filter assembly containing lower sideband and AM symmetrical filters are presented. Author

N65-28543*# General Precision, Inc., Glendale, Calif. Librascope Group.

STUDY OF PHYSICS OF FAILURE AND RELIABILITY IN MICROELECTRONIC DEVICES Third Quarterly Report, Feb. 15–Apr. 15, 1965

15 May 1965 313 p
(Contract NASw-973)
(NASA-CR-63821) CFSTI: HC $7.00/MF $1.75 CSCL 09A

As part of a study of the effects of prolonged space environments on solid state devices, data from verification tests on DTL NAND/NOR microcircuit gate configurations made by three manufacturers are presented. Operating life tests, temperature step stress tests, and temperature cycle tests were performed. Units from two of the vendors have completed 250 hours of life tests; those from the third manufacturer have completed 100 hours and have shown no significant changes in electrical parameters. All units under temperature stress test have completed the 250° C stress. The data for 200° C stress indicate that one of the units failed because leakage in one of the output diodes increased in excess of ten times the initial value. Temperature cycle tests of 360 hours at −65° C to +125° C show no variations in measurements. J.M.D.

N65-28549# California Univ., Berkeley. Electronics Research Lab.

MODES IN A RECTANGULAR WAVE-GUIDE FILLED WITH AN ANISOTROPIC DIELECT

J. Wakabayashi 12 Nov. 1964 16 p refs
(Contract Nonr-3656(11))
(Rept.-64-34; AD-610717)

The normal modes in a rectangular wave-guide filled with an anisotropic dielectric are examined. It is known that the general wave equation in rectangular coordinates is a quartic equation in k, the propagation constant. When the guide axis coincides with the principal axis of the dielectric, the wave equation becomes quadratic in k^2. This makes possible the existence of cut-off modes of a more complicated type involving a complex k_z instead of the usual type where k_z is real. These modes have unusual orthogonality properties. The existence of these modes leads to the investigation of propagating modes with asymmetric transverse distribution or with a phase-front not normal to the guide axis. Author

N65-28550# Joint Publications Research Service, Washington, D. C.

IZVESTIYA VUZov: RADIO ENGINEERING, VOLUME VIII, NO. 1, 1965

3 Jul. 1965 186 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Radiotekhn. (Kiev), v. 8, no. 1, Jan.–Feb., 1965 p 3–128
(JPRS-30938; TT-65-31437) CFSTI: $5.00

Studies are presented concerning feedback networks, irregular waveguides, pulse generator, traveling-wave tube, resonant system, highly directional antenna, stochastic signals, synchronous detector, ferrite transducer, and inductive parametron. For individual titles see N65-28551–N65-28572.

N65-28563 Joint Publications Research Service, Washington, D. C.

SELECTIVITY OF A SYNCHRONOUS DETECTOR WITH PREFILTER

G. A. Shtamberger and V. D. Gel'fand *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 117–122 refs (See N65-28550 17-09) CFSTI: $5.00

The application of a selective preamplifier with a relatively low Q-factor is considered for the improvement of interference characteristics of various measuring equipment. The results considered are valid for the resonance amplifier and other selective networks. In order to arrive at quantitative relations, the expressions for the amplitude-frequency and the phase-frequency characteristics of the networks must be known. E.E.B.

N65-28586# Joint Publications Research Service, Washington, D. C.

INVASION OF CHEMOTRONS

V. Lomanovich 12 Jul. 1965 13 p Transl. into ENGLISH from Znaniye-Sila (Moscow), no. 1, 1965 p 8–10
(JPRS-31030; TT-65-31528) CFSTI: $1.00

A chemotron (a special form of a reversible oxidation–reduction electrochemical cell) is described, and uses to which the chemotron can be applied are discussed. The main differences between the chemotron and an ordinary electrochemical cell is that its composition remains constant even though current is running through it. No material is either dissolved or deposited while operating. A noble metal, such as platinum must be used for the electrodes. It is envisaged that the chemotron cell will eventually be used in lieu of electrical components such as tubes or transistors for electronic computers and other electronic machines. L.S.

N65-28615# Army Electronics Labs., Fort Monmouth, N. J.

MODULATOR PULSE AND VARIABLE RANGE-GATE PULSE CIRCUIT FOR LIGHTWEIGHT RADAR APPLICATIONS

Michael A. Fanuele Jan. 1965 12 p refs
(ECOM-2568; AD-615448)

A lightweight range delay circuit containing a specially designed modulator and variable range–gate generator was developed to meet the need for accurate ranging circuits in small, lightweight combat surveillance radar systems. The circuit requirements were selected for compatibility with an experimental radar. The use of tunnel diode switches was the chief factor responsible for obtaining a simple, accurate circuit with good stability. Operation of the circuit is described in this report. Author

N65-28676# Texas Instruments, Inc., Dallas. Semiconductor Components Div.
ADVANCED FABRICATION PROCESSES FOR FUNCTIONAL ELECTRONIC BLOCKS Interim Engineering Report No. 14, 2 Sep.–2 Dec. 1964
W. T. Matzen 19 May 1965 76 p refs
(Contract AF 33(615)-1242)
(TI-03-65-39; AD-615752)

A study of the exponential voltage-current behavior of a certain reverse biased NPN transistor has been initiated. Investigations of the silicon adaptive element have continued. Emphasis has shifted from an optical to a thermal adaptive element. Design of the thermally stabilized dc amplifier is progressing. Device evaluation and design refinements are included. Development of an RC active filter for use as a bandpass amplifier is continuing. Performance tests of breadboard models have been made and data is presented. Preliminary design work has been completed for a 40 cps thermal oscillator. A high input impedance audio amplifier has been designed. Performance tests of a breadboard model have been made and photomasks for the integrated circuits are in process. Author

N65-28677# Microwave Electronics Corp., Palo Alto, Calif.
DEVELOPMENT OF PPM-FOCUSED LOW-NOISE TRAVELING-WAVE TUBES FOR K_u-, K-, AND K_a-BAND Interim Development Report, 1 Nov.–31 Dec. 1964
May 1965 23 p
(Contract NObsr-89323)
(IDR-6; AD-615369)

Included in this report are the final data sheets prepared for the balance of eight PPM-focused K_u-band low-noise TWT's to be delivered against this contract. The completely packaged K-band tube was put on vibration and shock tests in accordance with Class 2 requirement of the military specification MIL-E-5400 E (ASG). The tube has performed satisfactorily. The PPM stack and package design were finally resolved for the K-band tube. The package outline drawing is shown. The first PPM stack for the K_a-band tube was designed. As the result of the PPM-focusing study, 70 percent beam transmission was obtained with K_a-band tube 19. The K_a-band final vacuum envelope design was made to improve beam focusing. Author

N65-28682# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FACTORS DETERMINING SPECIFIC CAPACITY OF CAPACITANCE GENERATORS
E. A. Lodochnikov, V. P. Luk'yanchuk, and V. A. Kufa 7 Apr. 1965 15 p refs Transl. into ENGLISH from Elektrotekhnika (USSR), no. 11, 1964 p 8–11
(FTD-TT-65-291/1+2; AD-614785)

Discussed are factors, determining energy characteristics of disk type capacitance generators of unipolar and bipolar type, belonging to the class of machines, with transporter-conductors. Author

N65-28718# Harry Diamond Labs., Washington, D. C.
INSTABILITIES IN TRANSISTORIZED DOPPLER AMPLIFIERS
Wolfgang Wiebach 19 Feb. 1965 13 p ref
(HDL-TM-65-7; AD-615274)

Two types of instabilities in a transistorized Doppler amplifier are described. Depending on the particular design of the amplifier, one instability is caused by a ripple voltage of the power supply and the other is caused by the presence of a magnetic rf field of a particular frequency and field strength. The mechanism responsible for the oscillations in the second case is explained and demonstrated. Author

N65-28722# National Co., Inc., Melrose, Mass.
PRODUCTION ENGINEERING MEASURE FOR CESIUM BEAM TUBES Quarterly Progress Report, 23 Nov. 1964–23 Feb. 1965
James George [1965] 32 p
(Contract DA-36-039-AMC-01457)
(QPR-7; AD-614611)

The program is one of Production Engineering Measures for a general purpose cesium beam tube. This program is defined and divided into component tasks, and the tasks performed during the reporting period are described. The life test of the retrofitted PEM-E3 cesium beam tube was continued with satisfactory results. Problems in the area of the cesium detector, the microwave structure, the aluminum mounting structure, and the material finishes were resolved. The final PEM-E5 and PEM-E6 tubes were fabricated, assembled, processed, aligned, and tested under laboratory conditions. Lead times required for purchased components were significantly reduced. The quality assurance division began preparation of test procedures, tube specifications, and processing instructions for the manufacturing phase of the program. Author

N65-28841# Harry Diamond Labs., Washington, D. C.
ELECTRONIC SURVEY SYSTEM Final Report
Robert S. Goodman 30 Mar. 1965 74 p refs
(HDL-TR-1278; AD-615392)

The feasibility of developing an electronic survey system to determine the positions of locators within a circular area of 10 mi diam was studied. An accuracy of 2 1/2 ft is required of the system. The system analyzed has four reference stations (three slave transponders and a master command station) and portable locators (free-running pulse transmitters) as necessary. The locators are interrogated by the master station and their position is computed in real time. The computation is essentially a computation of the intersection of two hyperbolas. The design of a system with available components is described, but analysis indicates that errors of 5 to 8 ft can be expected. Analysis of the characteristics of electromagnetic propagation near the ground indicate that errors due to transmission irregularities can be adequately eliminated. Although some improvements in accuracy might be expected by using improved components, the improvement would not be adequate for this application without high accuracy in positioning reference stations. Author

N65-28924# Philco Corp., Landsdale, Pa.
RESEARCH AND DEVELOPMENT TO OBTAIN SEMICONDUCTOR DIODES FOR ELECTRONIC TUNING Final Engineering Report, 27 Jun. 1963–26 Dec. 1964
[1964] 124 p
(Contract NObsr-89508)
(Rept.-182; AD-615541)

The fabrication of 200-volt planar silicon diodes with an area of 0.1 to 0.4 sq cm was shown to be feasible, and techniques developed for obtaining that objective are described. It was concluded that additional improvements in yields and in electrical characteristics of devices could be realized by implementation of additional processing changes. Author

N65-28945# Lear Siegler, Inc., Grand Rapids, Mich. Instrument Div.
DEVELOPMENT OF EXPERIMENTAL GAS DISCHARGE DISPLAY Quarterly Progress Report No. 6, 24 Dec. 1964–24 Mar. 1965
Apr. 1965 12 p
(Contract NObsr-89201)
(GRR-65-1049; AD-614922)

Progress on the development of an experimental prototype gas discharge display panel with internal storage capability is reported. A number of simple tests were performed to make certain that no incompatibility of materials would be encountered in fabricating the final display. Various methods of incorporating the series resistors for each cell were examined. R.N.A.

N65-28949 European Organization for Nuclear Research, Geneva (Switzerland). Proton Synchrotron Machine Div.
MEASUREMENTS ON A HIGH-GRADIENT ACCELERATING TUBE MODEL—INVESTIGATION OF THE PROPERTIES OF TITANIUM ELECTRODES
J. Huguenin and R. Dubois 10 Jun. 1965 33 p refs
(CERN-65-23; PS-4856)

A 540 kV high gradient accelerating tube for protons is being developed in CERN. Model tests have been performed in order to investigate the effect of electrode material and geometries. DC breakdown tests across gaps ranging from 2.5 to 9.3 cm have shown the excellent properties of titanium as electrode material. At 2.5 cm and 2.10^{-6} mm Hg, the maximum cathode field was greater than 200 kV/cm and the maximum mean field equal to 190 kV/cm. Practically no current or X-rays could be observed between sparks. Following the results of these experiments, the electrodes of the CERN high gradient tube have been fabricated in titanium. Author

N65-28994# Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURE. MECHANIZATION FOR .4 WATT DIODES AND 2N560, 2N1051, 2N1072, AND 2N1195 TRANSISTORS, PHASE 2 Final Engineering Report, 1 Jan. 1963–31 Dec. 1964
M. N. Reppert [1965] 310 p
(Contract DA-36-039-SC-81294)
(AD-615537)

Operations were mechanized, refined, and updated. Most modifications were directed toward improving machine repeatability and reliability. Changes in machine concept produced extensive changes on the wafering, the painting and coating, and the assembling case to stud and welding operations. Less prominent changes to the Collector Lead to Platform Welding machine has also altered the machine concept. A Tip Welding and Lead Trimming machine has overcome a header production problem, and, at the same time, mechanized the glassing mold unload and lead trimming operation. A Data Producing Test Set for diodes automatically tests and records the test results on punched cards for computer processing. This machine is primarily used during final inspection for sample testing of the diodes. The results of this investigation have given positive evidence that thick aluminum contacts increase the vulnerability of bonded gold wire to 'Purple Plague'. TAB

N65-29007# Army Signal Research and Development Lab., Fort Monmouth, N. J.
RADIATION DAMAGE EFFECTS TO MOS-FET
Frederick Gordon 3 Dec. 1964 8 p

A preliminary examination of some enhancement type P-channel MOS field effect transistors has revealed an effect which could cause failure of a circuit in which these devices are used, when exposed to radiation (gamma or electrons). The observed effect is an increase in gate threshold voltage (^{V}GT, that voltage at which conduction between drain and source begins). Increases of a factor of two to three were experienced after 0.5×10^{6} rads exposure of Co 60 gammas. If one defines transconductance (gm) as the ratio of the change in drain current to the change in gate voltage ($^{\delta I}D/^{\delta V}G$), then no tendency toward increase or decrease was observed. Although some changes were noted, they had no clearly discernible direction. If one defines a DC transconductance (GM) as being equal to the quotient of the drain current divided by the gate voltage ($^{I}D/V_{G}$), then there is considerable decrease in transconductance (GM) due to the upward shift in gate threshold voltage with radiation. Author

N65-29024# Radio Corp. of America, Harrison, N. J. Microwave Tube Operations Dept.
A LOW-NOISE, MULTIPLE-FUNCTION, X-BAND TRAVELING-WAVE TUBE Interim Development Report No. 10, 1 Jan.–31 Mar. 1965
G. Hodowanec and M. Milden [1965] 16 p
(Contract NObsr-87535)
(Rept.-87535-Q10; AD-615610)

The report describes design modifications made on the electron-gun, -helix envelope, helix assemblies, and the video section of the multifunction tube. A DC wiring diagram of the tube is included. TAB

N65-29028# United Kingdom Atomic Energy Authority, Harwell (England). Electronics Div.
A LUMPED CONSTANT DELAY LINE WITH NEGLIGIBLE OVERSHOOT
R. Martin 1965 34 p refs
(AERE-R-4858)

This paper shows how a lumped parameter line may be designed, by the image parameter method, possessing negligible amplitude distortion when driven by a step function. The designed lines (R_{o} = 300Ω delay 100 nS to 2 μsecs) had a delay to rise time ratio of five to one and occupied approximately two hundred cubic centimetres. Author

N65-29071# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
BEHAVIOR OF DIFFUSION-BASE GERMANIUM TRANSISTORS IN A GAMMA-RAY FIELD
A. V. Yurovskiy and M. P. Sinyukov 16 Apr. 1965 8 p ref
Transl. into ENGLISH from Elektronno-Dyrochnyye Perakhody v Poluprovodnikakh, (Tashkent), 1962 p 315–318
(FTD-TT-64-1164/1+2; AD-615224)

High-frequency diffusion germanium transistors were irradiated with gamma radiation dose rates of 2 R/sec to 100 R/sec for total dose of 7.6×10^{4} to 1.0×10^{7} R. The effects of the radiation dose on the coefficient of amplification, output conductance, and the feedback current of the collector are reported. The most stable parameter proved to be the coefficient of current amplification which did not change beyond the error of the experiments. The output conductance increased sharply at 8.3×10^{6} R by 180% and the feedback current of the collector monotonically increased to almost 200% with a

dose of 1.0×10^6 R. The rise of the collector current is explained by the appearance of new surface channels, and the increase in the output conductance by leaks of the feedback current of the collector caused by the radiation. E.E.B.

N65-29105# General Electric Co., Johnson City, N. Y.
A STUDY OF THE USE OF REDUNDANT INFORMATION ON SPACE GUIDANCE SYSTEMS TO ACHIEVE MALFUNCTION DETECTION AND CONTROL Final Report, 15 Jun. 1963–15 Jan. 1964
Wright-Patterson AFB, Ohio, AF Avionics Lab., Apr. 1964 161 p refs
(Contract AF 33(657)-11654)
(AL-TDR-64-60; AD-436110)

A generalized orbital navigation system was synthesized and analyzed to determine techniques for attaining a system equivalent mean-time-to-failure of 40 000 hours for a 10 000 hour mission. Emphasis was placed on redundancy techniques for enhancing the reliability of the external monitoring and computer subsystems. Requisite reliability could not be achieved with a nonredundant configuration. It was determined that the principle failure mechanisms of the recommended measurement subsystems, an altimeter and range rate sensor, permit internal malfunction detection techniques to be used. A highly reliable range-only body-mounted radar of solid-state design was developed. It was improved by using internal error monitoring tests, a standby transmitter, and by eliminating the boresighting and tracking requirements. In studying ternary logic concept, a new technique of failure elimination logic was found to be superior. The feasiblity of a building block approach toward enhancing memory reliability was determined. A review of system requirements and reliability shows that the computer needs the greatest development. R.N.A.

N65-29134# Services Electronics Research Lab., Baldock (England).
S.E.R.L. TECHNICAL JOURNAL, VOLUME 15, NO. 2
H. J. Curnow et al Jun. 1965 63 p refs

Articles are presented on slow-wave structures in traveling-wave tubes; sealed-off neutron-generator tubes; and mobility measurements of heavily doped gallium arsenide. Two developments in the gas laser field are also reported. One concerns a 20 nsec pulsed neon discharge stimulated emission, produced without optical feedback in the red, orange, and green regions of the spectrum. It was found that the discharge tube behaves asymmetrically, in that equal quantities of superradiant light do not emerge from each end of the tube. In another development, stimulated emission at 10 new wavelengths between 126 and 373 microns was obtained with dimethylamine. The stronger lines were also obtained with seven related compounds and with several mixtures, notably methane and ammonia. A new spectrum (four lines between 181 and 205 microns) was obtained with a mixture of deuterium and bromine cyanide. The radiation is tentatively attributed to H_nCN with $n > 1$. M.G.J.

N65-29138*# Westinghouse Electric Corp., Newbury Park, Calif. Astroelectronics Dept.
MOLECULAR POWER SUPPLY-SYNCHRONIZER First Quarterly Report, May–Jul. 1962
[1962] 23 p Prepared for JPL
(Contracts NAS7-100; JPL-950237)
(NASA-CR-63914) CFSTI: HC $1.00/MF $0.50 CSCL 09E

The feasibility of forming an entire subsystem on a single silicon slice or on as few chips as possible is under study. The subsystem chosen is the digital portion of a power supply synchronizer, and a logic configuration which can produce signals from a single type logic circuit was designed. This logic circuit, or NAND gate, is formed with the necessary interconnecting patterns on a single silicon wafer; three phase output switches are formed on a second slice. The logic design consists of five stages of dc coupled binary counters, each stage using six NAND gates; a three phase generator using 12 NAND gates; an output buffer using a single NAND gate; and three PNP–NPN high voltage output switches. Schematics and the interconnection method are given. Also considered are designs for interconnection patterns and methods, the nonlinear load switch, and the package and die attach platform. C.T.C.

N65-29141*# Westinghouse Electric Corp., Baltimore, Md. Defense and Space Center.
LIMITED PHASE DEVIATION FREQUENCY MULTIPLIER PHASE MODULATOR, APPENDIX E Final Report
E. F. Osborne and J. B. Sivley 15 Dec. 1964 42 p refs Prepared for JPL
(Contracts NAS7-100; JPL-950144)
(NASA-CR-63907) CFSTI: HC $2.00/MF $0.50 CSCL 09C

Six basic types of phase modulators were reviewed, examined, evaluated, and classified, from which the small deviation dual mixer-multiplier and direct multiplier methods are serious candidate systems for an RF test console of given specifications, along with a phase locked modulator previously examined. Upon considering the design and mechanization problems, potential performance, complexity, and adaptability to dual mode PM/FM operation it is concluded that the phase locked modulator approach offers greater economy and ease of mechanization for the RF test console application. L.S.

10 ELECTRONICS

Includes circuit theory; and feedback and control theory. For applications see: 09 Electronic Equipment. For related information see: Specific Physics Categories.

N65-27988 Joint Publications Research Service, Washington, D. C.
ON STABILIZATION OF SYSTEMS IN WHICH NOISE DEPENDS ON THE VALUE OF THE CONTROL EFFECT
N. N. Krasovskiy *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 139–150 refs (See N65-27975 17-34) CFSTI: $6.00

The problem of determination of the control effect is investigated for a control effect which stabilizes the characteristically unstable motion of an object under the condition that in the control process random noise arises the intensity of which increases with an increase in the controlling force. The influence of this noise on the property of stability of the object is investigated. A method is indicated for numerical evaluation of the intensity of noise which disturbs the stability. The solution of the problem is supported by the theory of analytical construction of optimal regulators [1]. The work is contiguous with the investigations in [2, 3]. Author

N65-27989 Joint Publications Research Service Washington, D. C.
SYNTHESIS OF ANALYTICAL SELF-ADJUSTING SYSTEMS
V. V. Solodovnikov and V. V. Semenov *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 151–167 refs (See N65-27975 17-34) CFSTI: $6.00

A procedure is discussed for synthesis of algorithms of analytical self-tuning in a class of nonstationary systems which permits consideration of the presence of limitations on variation of the variables. Synthesis of the systems which are self-adjusting both in open and closed cycle is investigated. Author

N65-27990 Joint Publications Research Service, Washington, D. C.
DETERMINATION OF MATHEMATICAL EXPECTANCY AND DISPERSION OF REACTION OF A MULTIDIMENSIONAL NONLINEAR NONSTATIONARY SYSTEM BASED ON THE USE OF COMPUTERS
V. M. Aleksandrov, A. M. Batkov, A. N. Staroverov, and B. A. Shchukin *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 168–175 refs (See N65-27975 17-34) CFSTI: $6.00

The problem of analysis of accuracy of a nonstationary nonlinear control system described by the system of differential equations in the normal form is investigated. A procedure is proposed for construction of a nonlinear system of differential equations by means of single solution of which we obtain a change in the vector of mathematical expectancy and the dispersion matrix of the output signal in time. Use of the matrix apparatus permits carrying out the desired calculations in a quite compact manner. Author

N65-27991# Joint Publications Research Service, Washington, D. C.
SYNTHESIS OF OPTIMAL CONTROL OF LINEAR NONSTATIONARY STOCHASTIC SYSTEMS
Yu. V. Kozhevnikov *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 176–187 refs (See N65-27975 17-34) CFSTI: $6.00

The problem is formulated of synthesis of a control law which is optimal on the average for a linear system, part of the coefficients and phase coordinates of which based on the conditions of reproduction or measurement are random time functions. It is assumed that the control effect may be formed using information about the current values of time, the determined phase coordinate and the probability characteristics of the random functions—mathematical expectancies, dispersions, etc. A solution is obtained for the problem for linear systems and systems reduced to linear systems with respect to the centered random functions. Author

N65-27992 Joint Publications Research Service, Washington, D. C.
STATISTICAL SYNTHESIS OF CONTROL SYSTEMS WHICH ARE OPTIMAL WITH RESPECT TO INSENSITIVITY TO VARIATION OF PARAMETERS
R. S. Rutman *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 188–199 refs (See N65-27975 17-34) CFSTI: $6.00

A variation link procedure is discussed for analysis of sensitivity of control systems. Problems are formulated of synthesis of control systems in the presence of parameter variations. The problem is solved for synthesis of false systems which are optimal with respect to insensitivity to variations. The procedure calculated is illustrated by examples. Author

N65-27993 Joint Publications Research Service, Washington, D. C.
PROCESSES IN MULTIDIMENSIONAL SYSTEMS WHICH ARE OPTIMAL WITH RESPECT TO RAPID ACTION
A. B. Savvin *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 200–210 refs (See N65-27975 17-34) CFSTI: $6.00

A system is investigated consisting of n dynamically independent devices with differential equations of the first order the operation of which is joined in a common purpose. The processes which are optimal with respect to rapid action in this system are investigated where the purpose of the intermediate process is a phase space point, and also the inside and outside of some convex object. An essential peculiarity of the given problem is lack of uniqueness of the optimal intermediate processes and corresponding control laws. Author

N65-27994 Joint Publications Research Service, Washington, D. C.
INVARIANCE AND AUTONOMY IN MULTIPLY CONNECTED ESSENTIALLY NONLINEAR AUTOMATIC SYSTEMS
V. V. Pavlov *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 211–218 refs (See N65-27975 17-34) CFSTI: $6.00

The necessary and sufficient conditions for absolute invariance and autonomy for coordinates in multiply connected nonlinear automatic systems are indicated. Author

N65-27995# Joint Publications Research Service, Washington, D. C.
THE USE OF COMMUTED HARD FEEDBACK FOR CREATION OF ASTATISM IN AUTOMATIC CONTROL SYSTEMS WITH VARIABLE STRUCTURE
V. F. Viktorova *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 217–234 refs (See N65-27975 17-34) CFSTI: $6.00

The possibility is investigated for using commuted hard feedback for creation of astatism of high order in an automatic control system with variable structure. Development of the investigated automatic control system of a wide class of functions of control and excitation effects is analysized. Invariance of the automatic control system with commuted hard feedback with respect to the form and point of application of the effect and also to the parameters of the object of control is proved. Author

N65-28164# Harvard Univ., Cambridge, Mass. Cruft Lab.
ANALYSIS OF THE SYNCHRONIZATION OF AN AUTOMATIC PHASE CONTROL SYSTEM
Theodore S. Baker 25 Nov. 1964 184 p refs
(Contract Nonr-1866(16))
(TR-460; AD-610691)

Approximation techniques are developed to predict the ranges of system parameters for which a phase-locked loop synchronizes to a sinusoidal input of constant frequency. Analytic methods are presented as step-by-step procedures useful for solving other problems of nonlinear oscillations. The differential equation is derived for the phase-locked loop with sinusoidal phase comparator, and the general characteristics of the loop are illustrated by the exact analysis of the first-order loop equation and the phase-plane portraits of the second-order loop equation. Synchronization is examined for several phase-locked loops with different filters. Calculated values of bandwidth are compared with computed values from analog and digital computer solutions of the differential equation, and the modified Ritz method is applied to the second-order loop with lag filter and the third-order loop with cascaded low-pass filters. For all three filters, the values of bandwidth calculated by the approximation method are accurate within 5% of the computer solutions. E.E.B.

N65-28222# Joint Publications Research Service, Washington, D. C.
METHODS OF MATHEMATICAL REPRESENTATION OF CONNECTIONS IN COMPLEX ELECTRICAL NETWORKS
M. G. Maksymovich 6 Jul. 1965 8 p Transl. into ENGLISH from Dopovidi Akad. Nauk Ukr. RSR (Kiev), no. 5, 1965 p 570–572
(JPRS-30948; TT-65-31447) CFSTI: $1.00

Simple relationships are derived for finding network equations using set theory. Assuming as expedient the method of divided representation for a complex electrical network, the possibilities of representing such connection schemes are considered from the point of view of computer memory requirements. Using networks composed only of bipolar branches, and considering branches as the primary elements, the secondary elements are designated with the common term schematic products. Schematic expressions are written for each branch of the electrical network. E.E.B.

N65-28250# Joint Publications Research Service, Washington, D. C.
IZVESTIYA VUZov: INSTRUMENT BUILDING, VOLUME VIII, NO. 2, 1965
9 Jul. 1965 178 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Pribprostr. (Leningrad), v. 8, no. 2, 1965 p 3–145
(JPRS-30996; TT-65-31494) CFSTI: $5.00

Topics in this series concern construction of particular electronic devices, measurement of their outputs and errors, equipment stability and dependability, communications, and linear programing. For individual titles see N65-28251–N65-28275.

N65-28251 Joint Publications Research Service, Washington, D. C.
ON ERRORS IN MEASURING THE NOISE FACTOR OF TRANSISTORS OPERATING AT LOW FREQUENCIES
Yu. S. Karpov and Yu. A. Polyakov *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 6–12 refs (See N65-28550 17-10) CFSTI: $5.00

Errors in measuring the noise factor of transistors operating at low frequencies were analyzed by means of a direct method and a comparative method. It is shown that although the comparative method can ensure higher accuracy of measurement, it does not greatly surpass the accuracy of the direct method, due to the larger value of the relative error. The direct method of measurement was found to be easier to automate, thus eliminating the need for laborious measurements. This method of measurement is recommended since an accuracy of 20% is adequate when making noise measurements. The comparative method is recommended for the most accurate laboratory measurements where the productivity of the measuring device does not play a significant role. S.C.W.

N65-28252 Joint Publications Research Service, Washington, D. C.
AN APPROACH TO THE PROBLEM OF DETERMINING THE QUALITY FACTOR OF A NONLINEAR CIRCUIT
N. G. Kharatishvili *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 13–17 refs (See N65-28250 17-10) CFSTI: $5.00

Proposed is a method for measuring the quality factor of circuits with ferrite cores operating in strong high-frequency fields which involves comparing the envelope of the circuit's free oscillations with the envelope of the free oscillations of a linear circuit. Presented are results of an experimental analysis of an LCR series circuit with nonlinear inductance in which the form of the envelope of damping oscillations was determined. Experimental results were in good agreement with theoretical results. A block diagram of the proposed method is included. S.C.W.

N65-28254 Joint Publications Research Service, Washington, D. C.
TRANSIENT PROCESSES IN AN IMPEDANCE-COUPLED MAGNETIC AMPLIFIER
A. A. Krasnoproshina *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 / 27–35 (See N65-28250 17-10) CFSTI: $5.00

Proposed is a method, which focuses on the use of structural schemes, for calculating transients in an impedance-coupled magnetic amplifier as an essentially nonlinear line operating with any active inductive load, including a nonlinear load. Presented are theoretical and experimental data which illustrate the accuracy of the proposed method. It is also shown that by making use of the proposed structural scheme, it is possible to calculate transients in impedance-coupled magnetic amplifiers with the aid of analog computers. S.C.W.

N65-28256 Joint Publications Research Service, Washington, D. C.
A METHOD FOR MEASURING THE FREQUENCY ERROR OF RESISTORS
Z. I. Zelikouskiy and L. E. Degtyar *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 38–44 refs (See N65-28250 17-10) CFSTI: $5.00

Discussed is a method for determining the frequency error of resistors which consists of comparing the voltages across the investigated resistor and a reference resistor. Analyzed are inherent errors associated with the method which are induced by errors in voltmeter readings, possible inequality of voltages, the presence of frequency error in the reference resistor, and capacitance and active leakages in the contact device. Also discussed is a method for eliminating the shunting capacitances of contact devices. S.C.W.

N65-28257 Joint Publications Research Service, Washington, D. C.
CERTAIN POSSIBILITIES FOR CONTROLLING THE TIME CONSTANTS OF CIRCUITS WITH PHOTORESISTORS AND THERMISTORS
S. F. Korndorf and N. S. Muromova *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 45–50 refs (See N65-28250 17-10) CFSTI: $5.00

Reported is a theoretical and experimental analysis of the effects of load resistance on the time constants of circuits with photoresistors or thermistors. Also analyzed were methods for extending the range of control over these time constants. It was found that: (1) increasing the load resistance leads to a decrease in operating time of thermal and photo relays when the photoresistor is illuminated or the thermistor heated, and to an increase in operating time when the photoresistor is in the dark or the thermistor cooled; (2) introducing feedback to obtain a negative value of the load permits a sharp decrease in the time constant of the circuit when the photoresistor is in the dark or the thermistor is cooled, and (3) to insure high speed of a relay with photoresistors or thermistors, it is necessary to introduce feedback into the circuit. S.C.W.

N65-28260 Joint Publications Research Service, Washington, D. C.
ON A METHOD FOR IMPROVING THE QUALITY OF OPTIMIZING CONTROL
B. A. Aref'ev *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 67–76 refs (See N65-28250 17-10) CFSTI: $5.00

Proposed is a method for speeding up the output of a system in an optimal regime which involves making the speed of the actuating mechanism a function of the speed of the output coordinate of the controlled system. The proposed scheme can be realized in controllers with a floating network by using a simplified technique which does not require a special differentiating element. S.C.W.

N65-28262 Joint Publications Research Service, Washington, D. C.

GENERAL LINEAR THEORY OF ELIMINATION OF FEEDBACK LINE COMMUTATION IN A MATHEMATICAL MODEL FOR THE SOLUTION OF A SYSTEM OF TWO TRANSCENDENTAL EQUATIONS

A. N. Lebedev *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 85–91 refs (See N65-28250 17-10) CFSTI: $5.00

Described is a simplified procedure for eliminating feedback line commutation in mathematical models, which focuses on the use of trial-and-error root approximation methods for the solution of a system of two transcendental equations. Included are results of an analysis of the classical problem of constructing a vector in two components with the aid of coordinates not having natural reversibility. The proposed methods can also be extended to models for the solution of systems of any number of transcendental equations. S.C.W.

N65-28263 Joint Publications Research Service, Washington, D. C.

THE SOLUTION OF LINEAR PROGRAMMING PROBLEMS WITH THE HELP OF ALTERNATING CURRENT ANALOGUE MODELS

B. I. Klimets *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 92–98 refs (See N65-28250 17-10) CFSTI: $5.00

The feasibility of incorporating resonant circuits and fixed frequency alternating current as power sources in analog models for the electrical simulation of problems in linear programing was studied. Presented are data from an analysis of four pole networks which were used as elementary operators in alternating current computing circuits. The elementary operators and their complex circuits were found to have a high precision and stability in time for comparatively low requirements on the permissable relative stability of the frequency. On the basis of these findings, the four-pole networks were selected and used in the construction of an analog model for the solution of a transportation problem. The advantages and methods of perfecting the proposed models are discussed. S.C.W.

N65-28337# Polytechnic Inst. of Brooklyn, N. Y. Microwave Research Inst.

METHODS OF MEASURING INACCESSIBLE ARBITRARY LINEAR MICROWAVE TWO-PORTS

H. M. Altschuler 8 Sep. 1964 155 p
(Contract AF 49(638)-1402)
(PIBMRI-1238-64; AFOSR-64-2367; AD-610730)

New methods have been developed which make possible the measurement of the complete network description of inaccessible, arbitary, linear microwave two-ports located in highly frequency sensitive environments and under the constraints of very low permissibile power levels. The measurement methods and the associated network problems are discussed in detail and the circuitry developed for actually carrying out such measurements and the results of experiments intended to demonstrate the capability of this system are given. N.E.A.

N65-28503# Polytechnic Inst. of Brooklyn, N. Y. Dept. of Electrical Engineering.

MATHEMATICAL MODELS FOR DRIFT FAILURE ANALYSIS

Martin L. Shooman 1965 12 p refs Presented at 11th Natl. Symp. on Reliability and Quality Control, Miami Beach, Fla., 12–14 Jan. 1965
(Contract AF 49(638)-1402; Grant AF-AFOSR-62-280)
(AFOSR-65-0623; AD-614847)

This paper discusses several mathematical techniques which are available for the analysis of drift failures. Choice of appropriate distributions for the system parameters results in rather simple models for the system performance. The conventional techniques of drift failure analysis are "stacking-up-the-tolerance", worst case analysis, and expansion of the performance function in a Taylor series which is truncated after the linear terms. These techniques are simple to apply but are rather inaccurate in many cases. The very general approach involving the change of random variables theorem is discussed, however, the resulting integral expressions are only amenable to solution and interpretation in special cases. The most common special case is the linear combination of Gaussian distributions. Many more cases can be solved if only the moments of the performance function are desired. Author

N65-28551 Joint Publications Research Service, Washington, D. C.

PULSE GENERATORS WITH FOUR-TERMINAL FEEDBACK NETWORKS

V. V. Grigorin-Ryabov *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 1–10 ref (See N65-28550 17-09) CFSTI: $5.00

The possibility is analyzed here of building pulse generators with passive four-thermal feedback networks which contain all the reactive elements in the circuit. Author

N65-28552 Joint Publications Research Service, Washington, D. C.

CALCULATION OF WAVEGUIDE INHOMOGENEITIES BY MEANS OF THE LORENTZ LEMMA

N. V. Lyapunov, A. G. Shein, and A. I. Tereshchenko *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 11–19 refs (See N65-28550 17-09) CFSTI: $5.00

A procedure is derived for approximately calculating the parameters of inhomogeneities in a waveguide. The method is based on applying Lorentz's lemma and the power balance equation. Author

N65-28553 Joint Publications Research Service, Washington, D. C.

CALCULATION OF IRREGULAR WAVEGUIDES BY THE EQUIVALENT RESONATOR METHOD

E. L. Kulikov, V. S. Il'in, and V. K. Il'in *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 20–31 refs (See N65-28550 17-09) CFSTI: $5.00

A new method is proposed for calculating irregular waveguides; it reduces the solution of the waveguide problem to a corresponding resonator problem. The proposed method is quite simple and efficient. In a number of cases it is possible to estimate with it the accuracy of calculated data. Author

N65-28554 Joint Publications Research Service, Washington, D. C.

ON CALCULATING THE OPTIMUM DISTRIBUTION OF POTENTIAL IN THE ELECTRON GUN OF A LOW-NOISE TRAVELLING-WAVE TUBE

F. L. Sayakhov *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 32–43 refs (See N65-28550 17-09) CFSTI: $5.00

A procedure is shown for calculating the distribution of potential and the length of the transforming portion of the gun at which the noise factor in a TWT is minimum. Certain laws concerning the changes of the effective plasma wave number in the accelerating region serve as the starting point. Calculations are performed with the one-dimensional and single-speed approximation for the fundamental space-charge wave in the flux; the coefficient of reduction of plasma frequency accounts for the fact that the flux cross-section is finite. Author

N65-28556 Joint Publications Research Service, Washington, D. C.
CALCULATION OF NONLINEAR SHAPING LINES WITH FERRITES
A. Belyantsev and Yu. K. Bogatyrev *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 51–60 refs (See N65-28550 17-09) CFSTI: $5.00

An approximate procedure is proposed for engineering calculations of a coaxial and artificial line with ferrites shaping heavy video pulses in the nanosecond rise time range. Author

N65-28557 Joint Publications Research Service, Washington, D. C.
ON CHOOSING THE OPTIMUM SHAPE FOR A MULTIMODE RECTANGULAR WAVEGUIDE TRANSITION
A. I. Tereshchenko and V. V. Dolzhikov *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 61–70 refs (See N65-28550 17-09) CFSTI: $5.00

The geometry of a tapered waveguide transition between two rectangular waveguide sections of similar cross-sections is analyzed, for the cases of stretching in the E– plane and in the H– plane. The shape obtained ensures minimum losses in conversion of the fundamental mode into the nearest spurious modes and a minimum reflection coefficient for the fundamental mode. The tapered transition is compared with a rectangular one and a stepped one whereby the advantages of the proposed shape are made evident. Author

N65-28558 Joint Publications Research Service, Washington, D. C.
APPROXIMATE METHOD FOR CALCULATING RESONATORS WITH A DIELECTRIC
G. F. Semenov *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 71–84 refs (See N65-28550 17-09) CFSTI: $5.00

Transcendental equations are derived suitable for an approximate calculation of waveguide resonators with a dielectric; the latter, with arbitrary dimensions, constitutes a homogeneous body bounded by surfaces parallel to the resonator walls. Author

N65-28559 Joint Publications Research Service, Washington, D. C.
TRANSFER FUNCTIONS OF CERTAIN RESONANT SYSTEMS FOR SMALL PERTURBATIONS OF THE VOLTAGE PHASE
Ye. M. Plotnikov *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 85–93 refs (See N65-28550 17-09) CFSTI: $5.00

Approximate expressions for the transfer functions in operator form are found in the case of small phase perturbations at the resonance amplifier, frequency multiplier, and regenerative frequency divider inputs by using the method of shortened symbolic equations. A satisfactory agreement of the results with the exact solution is shown for the case of a step change in the phase of the input voltage. Also, it is shown that it is possible with this method of shortened symbolic equations to investigate in a rather simple manner the effect which the variations of resonance circuit parameters have on the amplitude and phase of the output voltage in these devices. Author

N65-28560 Joint Publications Research Service, Washington, D. C.
ERRORS IN THE MEASUREMENT OF PHASE SHIFTS AT UHF WITH CERTAIN INTERFERENCE TYPE INSTRUMENTS
I. M. Grankin and V. A. Ishchenko *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 94–101 refs (See N65-28550 17-09) CFSTI: 5.00

Phase shift measurements at ultra-high frequencies are analyzed, where an interference type instrument is used with the measuring line serving as phase rotator standard. Further analyzed are the errors in measurement due to a mismatch between individual components of the system, considering also the damping introduced by the component under test. Author

N65-28561 Joint Publications Research Service, Washington, D. C.
CALCULATION OF THE FIELD FOR A SYMMETRICAL AIR-FILLED STRIP-LINE UNDER STATIC CONDITIONS
N. S. Kovalev *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 102–112 refs (See N65-28550 17-09) CFSTI: $5.00

Conformal mapping is described by means of which formulae for calculating the field of a symmetrical air-filled strip-line under static conditions are derived. The results of this investigation are shown as field maps in the complex ζ- and z- planes. Author

N65-28564 Joint Publications Research Service, Washington, D. C.
ANALYTICAL CALCULATION OF THE TRANSFER RATIO OF TRIPLE-WAVEGUIDE DIRECTIONAL COUPLERS CONNECTED IN CASCADE
Ye. S. Sablin *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 123–128 refs (See N65-28550 17-09) CFSTI: $5.00

The problem of calculating the transfer characteristics of triple-waveguide directional couplers in cascade are considered based on using closed expressions for the elements of the general transfer matrix of a cascade with any arbitrary number of sections. It was assumed that the cascade of directional couplers consisted of identical sections in which all elementary couplers were oriented ideally and matched completely at all frequencies. The matrix is derived for one section of the network, and an expression is given from which all elements of the matrix for the triple waveguide directional coupler cascade can be written. E.E.B.

N65-28566 Joint Publications Research Service, Washington, D. C.
CONSIDERATION OF THE THERMAL VELOCITIES OF ELECTRONS UNDER STEADY-STATE CONDITIONS IN CENTRIFUGAL-ELECTROSTATIC FOCUSING
G. N. Korostelev *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 134–141 refs (See N65-28550 17-09) CFSTI: $5.00

Analytical expressions are derived for the quantitative evaluation of the effect of thermal velocities of electrons on the pulsation of electron fluxes and on the limiting currents in actual systems with centrifugal-electrostatic focusing. The calculations show that a noticeable effect of thermal velocities on the flux pulsations and on the limiting currents in such systems sets in at $V < 500$ V. In this range of focusing voltage values it is necessary to account for the effect of thermal velocities of electrons and to introduce appropriate corrections. E.E.B.

N65-28569 Joint Publications Research Service, Washington, D. C.
EFFECT OF REFLECTIONS ON THE ACCURACY OF GROUP DELAY MEASUREMENT
V. V. Molebnyy *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 153–157 refs (See N65-28550 17-09) CFSTI: $5.00

The effect of reflections at the terminal of a delay line with amplitude or frequency modulation by a sinusoidal voltage is analyzed. The phase-frequency characteristic of a uniform line was assumed to be linear within the range of the measured signal. Expressions are given for the signal at the delay line output without reflections for the case of amplitude modulation and for the case where reflections do occur. During pulse modulation the reflected signals are suppressed by means of an amplitude limiter. This is feasible since the reflected signals are smaller in magnitude than the original signals. Also, pulse modulation is particularly advantageous in dealing with large reflections. E.E.B.

N65-28570 Joint Publications Research Service, Washington, D. C.
APPLICATION OF THE MIRROR-IMAGE METHOD IN CALCULATING THE SCATTERING MATRIX OF A SLOTTED-WAVEGUIDE BRIDGE
Ye. S. Sablin *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 158–165 refs (See N65-28550 17-09) CFSTI: $5.00

The mirror-image method is used to calculate the scattering matrix of a slotted-waveguide bridge. The slotted bridge, with cophasal or with contraphasal excitation is treated as a four-terminal network. A procedure is outlined for the calculation of the slotted bridge with consideration of a sudden contraction of the coupling section and taking into account the admittance of the slug tuner. The formulas proposed are equivalent to those derived previously for scattered waveguide systems. The method of mirror images makes the analysis more comprehensible. E.E.B.

N65-28571 Joint Publications Research Service, Washington, D. C.
ON CALCULATING THE PUMPING CIRCUIT OF AN INDUCTIVE PARAMETRON
V. A. Sokolov *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 166–169 refs (See N65-28550 17-09) CFSTI: $5.00

Equations are derived for the parameters of the supply source for the design of logic circuits with parametrons, and a representative problem is solved as an illustration of the simplicity of the calculation. E.E.B.

N65-28680# Laboratory for Electronics, Inc., Boston, Mass.
APPLICATION OF THE FOURIER TRANSFORM TO PATTERN RECOGNITION Final Report
Robert E. Evans, Morton Elmer, and Ronald J. Webber Griffiss AFB, N. Y., RADC, Apr. 1965 83 p ref
(Contract AF 30(602)-3359)
(RADC-TDR-64-456; AD-615638)

The use of Fourier Transform methods in pattern recognition is investigated. Two uses of the transform are suggested: (1) the Fourier coefficients of a pattern could be used as properties characterizing the pattern if such a representation is more efficient than using the pattern itself; and (2) the transform could be useful in preparing visual data for a pattern recognition device. Simulation on a computer of various ways of using the Fourier Transform in pattern recognition was done. It was concluded that while the Fourier Transform may not be applicable to (1) above, it is definitely useful as a preprocessing aid. Author

N65-28695# Lincoln Lab., Mass. Inst. of Tech., Lexington.
ARRAY BEAM-FORMING NETWORKS
L. J. Ricardi 13 Apr. 1965 30 p refs *Its* Technical Note No. 1965-12
(Contract AF 19(628)-500)
(AD-615522)

This technical note presents a brief description of the various types of beam-forming networks and their salient characteristics. Particular emphasis is placed upon the differences between time delay and phase shift and the problems arising from multiple reflections within the network. Some practical networks are described and the physical limitations of multiple beam-forming networks are discussed briefly. Author

N65-28725# Joint Publications Research Service, Washington, D. C.
DEVELOPMENTS IN CYBERNETICS RESEARCH
12 Jul. 1965 62 p refs Transl. into ENGLISH of 6 articles from Izv. Sibirsk. Otd. Akad. Nauk SSSR, Ser. Tekhn. Nauk (Novosibirsk), v. 10, no. 3, 1964 p 3–8, 18–26, 34–38, 45–50, 81–90, 103–109
(JPRS-31046; TT-65-31544) CFSTI: $3.00

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6. THE PROBLEM OF VYSHNEGRADSKIY IN DIRECT CONTROL THEORY WITH ACCOUNT FOR DELAY AND DERIVATIVE ACTION P. V. Sergeyev p 51–59 refs (See N65-28731 17-10)

N65-28726 Joint Publications Research Service, Washington, D. C.
PROCESSING INFORMATION IN AUTOMATA FOR SORTING RADIO COMPONENTS
F. B. Grinevich and T. N. Mantush *In its* Develop. in Cybernetics Res. 12 Jul. 1965 p 1–9 refs (See N65-28725 17-10) CFSTI: $3.00

Various computer circuits used in processing information for the automatic programed sorting of radio components are compared. In processing information, the computer performs specific logic operations which result in finding the sorting group of each inspected radio component. The input information of the computer is the data on the accuracy classes of the nominal values being considered and the output is the data on the sorting groups. The sequential computer processes information in accordance with the arrival of the input binary data on the nominal values and the accuracy classes of the

components. The parallel computer processes information while accepting all the input binary data simultaneously. The parallel-series computer processes information as a parallel device in one stage and as a series device in another stage. In the parallel computer it is necessary to determine the states of the input quantity to the computer which account for the spatial positioning of the contacts on all the sorting limits. The sequential computer is not dependent on the states of the input quantity on the sorting limit, but requires additional memory and readout units. The parallel-series computer eliminates all dependence of the input states on the sorting limit. R.N.A.

N65-28727 Joint Publications Research Service, Washington, D. C.

SYNTHESIS OF OPTIMAL RESPONSES BASED ON SWITCHING LINE MECHANIZATION

V. M. Aleksandrov and A. A. Nesterov *In its* Develop. in Cybernetics Res. 12 Jul. 1965 p 10–21 refs (See N65-28725 17-10) CFSTI: $3.00

A method for determining the control portion of a second order optimal response system with complex roots is presented based on switching line mechanization. The method for obtaining the switching line in parametric form is valid in the case of transition at the coordinate origin and at any admissible point of the phase plane. In the case of real eigenvalues of the process matrix, the technique for calculating the switching line is simplified. The simplest technical mechanization of the control portion of the optimal response control system in the case of transition at a fixed point is achieved with the use of functional converters. R.N.A.

N65-28728 Joint Publications Research Service, Washington, D. C.

DETERMINATION OF RESPONSE OF AN OPTIMAL REGULATOR

A. S. Anisimov and A. I. Vasil'yev *In its* Develop. in Cybernetics Res. 12 Jul. 1965 p 22–28 refs (See N65-28725 17-10) CFSTI: $3.00

Expressions are presented for determining the minimal possible time of the transient process in an ideal optimal regulator with an arbitrary magnitude of a step input as a function of the parameters of the actuating motor and the controlled object. In a real system this time cannot be achieved and serves only as the limit of the system capabilities being strived for. The expressions are useful in studying the parameter effects on the duration of the transient process and consequently are useful in the design of fast response electric motors and in the selection of motors for control systems. R.N.A.

N65-28730 Joint Publications Research Service, Washington, D. C.

ON THE POSSIBILITY OF DECREASING THE NUMBER OF LOGICAL ELEMENTS BY THE COMBINATION OF WHOLE SYSTEMS OF ALGEBRAIC LOGIC FUNCTIONS

B. G. Matiyenko *In its* Develop. in Cybernetics Res. 12 Jul. 1965 p 37–50 refs (See N65-28725 17-10) CFSTI: $3.00

It is possible to minimize the number of universal logical elements used in computer circuits by combining the control processes of complete systems of algebraic logic functions and making the equivalent transformations of equations in the control device which synthesizes the network or in the synthesis of discrete devices by usual methods on the basis of the usual logic elements. R.N.A.

N65-28731 Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF VYSHNEGRADSKIY IN DIRECT CONTROL THEORY WITH ACCOUNT FOR DELAY AND DERIVATIVE ACTION

P. V. Sergeyev *In its* Develop. in Cybernetics Res. 12 Jul. 1965 p 51–95 refs (See N65-28725 17-10) CFSTI: $3.00

The effect of lag on the stability of direct control systems and the effectiveness of rate control on such systems are investigated. The method of analysis used is based on the D-partition operation. The system is reduced to a four parameter form which is geometrically interpreted as a four dimension hyperspace. The system lag and rate control are considered primary parameters and their improper selection cannot be compensated by the other two parameters, mass and viscous friction. From a stability viewpoint, the range of permissible lag values can be selected by introducing rate control. A diagram is included for selecting structural parameters. With these parameters the optimal rate control can be selected which will provide system stability with minimal damping. R.N.A.

N65-28895# European Space Research Organization, Paris (France).

ULTRA VIOLET CALIBRATION IN SPACE RESEARCH

Introductory Report

D. Malaise 3 May 1965 8 p

(LAS/26)

Model diagrams of an ultraviolet space experiment is given and the calibration procedure of the experiment is discussed. The relationship of output to input is considered and the purpose of the calibration is to establish the output. The functional relationship of the output may depend on parameters such as the temperature of the detector, voltage, power supply and other electric parameters. The system calibration is split into a number of subsystem or module calibrations and the output function is constructed from these. The wavelength range region covered is from 1000 Å to 3500 Å. L.S.

N65-29064# Joint Publications Research Service, Washington, D. C.

LARGE REMOTE CONTROL SYSTEMS WITH MULTISTEP CONTROL

V. A. Il'in 29 Jul. 1965 9 p Transl. into ENGLISH from Vestn. Akad. Nauk SSSR (Moscow), no. 5, 1965 p 72–76 (JPRS-31298; TT-65-31795)

The application of large scale telemechanical (remote control) systems to communications, oil and gas pipelines, electrical stations, and airplane ticket sales is discussed. Studies indicate that in the design of these systems a unified, system-oriented approach to the entire multistage control system is needed with optimization of the system structure, with optimal code selection for all control stages, with standardized inputs and outputs, and with standardization of all the system parts. L.S.

11 FACILITIES, RESEARCH AND SUPPORT

Includes airports; lunar and planetary bases including associated vehicles; ground support systems; related logistics; simulators; test facilities (e.g., rocket engine test stands, shock tubes, and wind tunnels); test ranges; and tracking stations.

N65-28121# Aerospace Corp., Patrick AFB, Fla. Launch Site Engineering Section.

TITAN III ITL SYSTEM LAUNCH FACILITIES AT CAPE KENNEDY

H. E. Eley et al 25 Jun. 1965 67 p
(Contract AF 04(695)-469)
(TOR-469(A5306)-1; AD-465593)

The ITL System provides facilities for the integration, transfer, and launch of the Titan III-C at Cape Kennedy. These facilities are presented in illustrations and accompanying descriptive data. The general ITL layout is followed by detailed drawings and data for the four major areas that comprise the ITL System: (1) Solid Motor Processing Buildings, (2) Vertical Integration Building, (3) Solid Motor Assembly Building, and (4) Launch Complexes 40 and 41 at the Cape Kennedy Air Force Station, Florida. Author

N65-28137# Stanford Univ., Calif. Stanford Linear Accelerator Center.

TWO-MILE ACCELERATOR PROJECT Quarterly Status Technical Report, 1 Oct.–31 Dec. 1964

Apr. 1965 116 p refs
(Contracts AT(04-3)-400; AT(04-3)-515)
(SLAC-42) CFSTI: $4.00

The progress on the construction of the laboratory and its two-mile long linear electron accelerator is reported. The facility will provide a fully operable accelerator and sufficient equipment to measure and control the principle parameters of the electron beam. Also, provision is made for an initial complement of general-use research equipment with which to perform certain exploratory studies, such as measurement of the intensity and energy distribution of various secondary-particle beams. E.E.B.

N65-28180 Joint Publications Research Service, Washington, D. C.

APPARATUS FOR GEOPHYSICAL INVESTIGATIONS

O. A. Volkovitskiy *In its* Transl. from Meteorol. i Gidrol., No. 6, 1965 2 Jul. 1965 p 37–43 refs (See N65-28175 17-20) CFSTI: $3.00

This article reports the development and the perfecting of a complex of experimental apparatus making it possible to carry out laboratory investigations in the fields of cloud physics and physics of aerosols. The complex of apparatus consists of a specially constructed building, called the aerosol building, which houses a large aerosol chamber, temperature–pressure chamber, a chamber for carrying out experimental investigations, and vertical and horizontal wind tunnels. A description is given of each of the mentioned portions of the complex of experimental apparatus. N.E.A.

N65-28183# AVCO Corp., Wilmington, Mass. Research and Advanced Development Div.

A HIGH TEMPERATURE X-RAY DIFFRACTOMETER SPECIMEN HOLDER Final Report

Russell F. Dreikorn 1 Apr. 1965 80 p refs
(Contract AF 19(628)-4001)
(R400-65-198; AFCRL-64-118; AD-614597)

A high temperature furnace for use on a horizontal diffractometer has been designed and constructed. It can heat samples to 2250° C in vacuum or 1790° C in air for sustained periods without restricting the normal operation of the diffractometer. Mechanical adjustments compensate for the unknown thermal expansion of the internal parts of the furnace and a rotating mechanism reduces the effect of grain growth and recrystallization by improving particle statistics in the X-ray beam. By simple adjustments the furnace can be used on the Picker, Rigaku-Denki, and Siemens diffractometers. Author

N65-28365*# Giannini Controls Corp., Duarte, Calif. Control/Nucleonics Div.

LARGE STORAGE TANK MASS DETERMINATION STUDY Second Quarterly Report, Oct.–Dec. 1964

J. G. Kyser 23 Feb. 1965 27 p
(Contract NAS8-11311)
(NASA-CR-63812; ER-80208) CFSTI: HC $2.00/MF $0.50
CSCL 14B

The study phase of an investigation techniques to determine the mass of large storage tanks was completed and a design approach selected. Optical absorption, neutron moderation, gamma absorption and backscatter, and beta absorption and backscatter techniques were considered. A gamma ray absorption method was selected and a detailed error analysis for the method was performed. A preliminary determination of the system parameters from this analysis was completed. Radiation safety and source handling problems were considered. The details of the system description, parameter selection, radiation safety precautions are discussed, and a summary of the preliminary system specifications are presented. R.N.A.

N65-28591# Travelers Research Center, Inc., Hartford, Conn.

FURTHER STUDIES OF SPACE AND TIME VARIATIONS IN ATMOSPHERIC TRANSMISSION ALONG AIRPORT RUNWAYS Technical Report No. 3

Keith D. Hage and Herbert D. Entrekin Mar. 1965 37 p refs
(Contracts FA-65-WA-1192; Cwb-10704)
(SRDS-RD-65-6)

Space and time variations of transmission of visible light in the atmosphere during fog and precipitation are examined in detail as a preliminary step in the development of suitable short-period prediction techniques to be used at aviation terminals. The relative space scales of various classes of obstructions-to-vision are estimated and compared with similar estimates. The apparent movement of the transmission field is derived and is related, insofar as possible, to advective and warm frontal movements. The potential predictability of linear translation of the transmission field is evaluated for periods of 5 to 25 minutes. Conditional frequencies of runway visual range for selected space and time lags are presented. Author

N65-28600# Toronto Univ., (Ontario). Inst. for Aerospace Studies

ANNUAL BULLETIN, 1965

Mar. 1965 65 p

The Annual Bulletin of the Institute for Aerospace Studies, University of Toronto is intended to (1) provide prospective students of the aerospace engineering sciences, both

undergraduate and postgraduate, with information concerning the programs offered at the University of Toronto; and (2) to serve as a year book for the staff and students of the Institute, containing a record of the various activities of interest, and of the student body past and present. Information presented in the Bulletin includes: a brief history of the Institute; teaching staff; facilities and research; finance and assistance to students; fees; admission procedures; staff notes; student notes; Institute activities; and UTIAS seminars. N.E.A.

N65-28632*# Space Technology Labs., Inc., Redondo Beach, Calif.
PARTICLE PARAMETER SELECTION SYSTEM FOR AN ELECTROSTATIC PARTICLE ACCELERATOR
J. F. Friichtenicht Washington, NASA, Jul. 1965 11 p refs (Contract NASw-936)
(NASA-CR-263) CFSTI: HC $1.00/MF $0.50 CSCL 14B

A particle parameter selection system for an electrostatic particle accelerator is described. When used alone, its velocity sensing and gate circuit is useful in the detection and measurement of very small high speed particles because of the noise reduction inherent in the system. Its deflection system is useful in cases where it is desirable to protect the target from bombardment by particles possessing characteristics other than those within a given range. The system's ability to preferentially select certain parameters in advance reduces the time spent in experiments requiring extensive post-bombardment analysis. The system's selection mechanism is based on a velocity measurement which determines particle mass to an accuracy determined by variations in the charging mechanism. If such variations are excessive, the system can be modified to eliminate them by adding the requirement that the signal amplitude lie within some small interval. The simultaneous specification of particle charge and velocity is sufficient to specify particle mass for a given accelerating voltage. R.N.A.

N65-28709# Joint Publications Research Service, Washington, D. C.
INFLUENCE OF INERTIA ON THE PRECIPITATION OF AEROSOL PARTICLES FROM A FLOW IN THE CASE OF SUBCRITICAL STOKES NUMBERS
L. M. Levin and Yu. S. Sedunov 22 Jul. 1965 9 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR, Ser. Mat., Fiz. (Moscow), v. 152, no. 2, 1965 p 316–319
(JPRS-31207; TT-65-31704) CFSTI: $1.00

A system of equations for simultaneously describing diffusion and inertia phenomena were derived. It is indicated that allowance for the joint effect of inertia factors and diffusion lead to the manifestation of some new effects and can appreciably change the value of the coefficient of capture, this affecting concepts concerning the precipitating of aerosol particles. L.S.

N65-28735*# Hayes International Corp., Birmingham, Ala. Missile and Space Support Div.
DESIGN STUDY OF SPECIAL PURPOSE SYSTEMS FOR THE LUNAR SURFACE
P. J. Adinolfi and F. A. Heinz, Jr. 30 Apr. 1965 106 p refs (Contract NAS8-5307)
(NASA-CR-61077; H-MOL-29) CFSTI: HC $4.00/MF $0.75 CSCL 22D

This report deals with special purpose equipment that will be required to support lunar surface operations with emphasis on the 1969 to 1975 time period. Special purpose equipment as used here pertains to items such as tools; small wagon-like vehicles; portable shelters and shields; emergency devices; etc. Their purpose is to complement the scientific equipment and other systems, specifically LSSM, MFS, MOLAB and LEM shelter. The pattern of the study was to analyze the missions to determine the support operation and tasks which needed to be performed, then to plot charts of tasks versus equipment. Based on these equipment requirements, conceptual designs were derived. The objective was to provide a limited number of multi-purpose devices which would replace the many items of equipment listed on the charts. These multi-purpose devices and their applications are described in the report. The utilization of existing lunar equipment by rework and conversion is also considered. Author

N65-28743# Naval Ordnance Lab., White Oak, Md.
THE NOL 3 MW 3-PHASE A-C ARC HEATER (MARK II)
R. E. Lee and R. L. Humphrey Jul. 1965 31 p refs
(NOLTR-63-222; Aerodynamics Res. Rept.-210; AD-465797)

An a-c arc heater developed for the NOL 3 MW research arc is described. This heater has three doughnut-shaped electrodes with internal coils to increase the magnetic field strength. The operation and performance of this design are discussed. Temperatures from 3500 to 4000° K with efficiencies from 15 to 23 percent were obtained at pressures from 10 to 15 atmospheres. Multiple arc streamers and the diffusion of the arc into the center of the chamber were observed. A high level of contamination of the effluent gas, an unsatisfactory magnetic design, and short component life make the design unsatisfactory. Methods of eliminating these problems are discussed. Author

N65-28805*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A STUDY OF GAS INJECTION IN THE BOUNDARY LAYER OF A HYPERSONIC WIND TUNNEL TO EXTEND THE USEFUL OPERATING RANGE
John B. Mc Devitt Washington, NASA, Jul. 1965 34 p ref
(NASA-TN-D-2935) CFSTI: HC $2.00/MF $0.50 CSCL 14B

An experimental study has been made of a method for extending the useful operating range of low-density hypersonic wind tunnels. A gas injection scheme is utilized for increasing the stream momentum in the test-section boundary layer in order to eliminate upstream feedback of pressure disturbances in the thick viscous layer at the tunnel walls. Test results obtained in a helium tunnel at Mach numbers from 10 to 25 indicate that energizing the test-section boundary layer is an effective means for avoiding the feedback problem and is particularly useful as a means for starting and maintaining steady hypersonic flow in the test section when models creating large asymmetrical flow disturbances are being tested. The minimum tunnel compression ratio required for the design Mach number is also significantly reduced when an injector system is used since the energy of the injected medium contributes to the energy of the stream entering the diffuser. A stream energy parameter, independent of the test Mach number, was found to be useful in correlating the test data relating to the required operating conditions for maintaining stable hypersonic flow in the test section. Author

N65-28812# Atomic Energy Commission, Washington, D. C. Div. of Technical Information.
INTERNATIONAL CONFERENCE ON HIGH ENERGY ACCELERATORS, BOOK I
A. A. Kolomensky, A. B. Kusnetsov, and A. N. Lebedev, ed. [1963] 702 p refs Conf. held at Dubna, USSR, 21–27 Aug. 1963 Sponsored by the Intern. Union for Pure and Appl.

Phys. (IUPAP) and the State Atomic Energy Comm. of the USSR
(CONF-114, Book 1) CFSTI: $15.00 (2 books)

CONTENTS:

1. ACCELERATORS FOR ENERGIES ABOVE 10^{11}eV p 1–123 refs
2. PROTON AND ELECTRON SYNCHROTRONS FOR ENERGIES UP TO 10^{11}eV p 125–305 refs
3. COLLIDING BEAMS AND STORAGE SYSTEMS p 307–503 refs
4. LINEAR ACCELERATORS p 505–702 refs

N65-28813# Atomic Energy Commission, Washington, D. C. Div. of Technical Information.
INTERNATIONAL CONFERENCE ON HIGH ENERGY ACCELERATORS, BOOK 2
A. A. Kolomensky, A. B. Kusnetsov, and A. N. Lebedev, ed. [1963] 809 p refs Conf. held at Dubna, USSR, 21–27 Aug. 1963 Sponsored by the Intern. Union for Pure and Appl. Phys. (IUPAP) and the State Atomic Energy Comm. of the USSR
(CONF-114, Book 1) CFSTI: $15.00 (2 books)

CONTENTS:

1. CYCLOTRONS AND SYNCHROCYCLOTRONS WITH SPATIALLY VARYING MAGNETIC FIELD p 703–865 refs
2. EXTRACTION, FOCUSING AND SEPARATION OF BEAMS—PROBLEMS OF SHIELDING p 867–1076 refs
3. THEORETICAL PROBLEMS OF THE OPERATION OF HIGH ENERGY ACCELERATORS p 1077–1276 refs
4. RADIOELECTRONICS AND METHODS OF OBSERVATION AND CONTROL OF BEAM IN ACCELERATORS p 1277–1394
5. NEW METHODS AND HIGH CURRENT ACCELERATORS p 1395–1499

N65-28874*# RAND Corp., Santa Monica, Calif.
COMPUTER-ASSISTED COUNTDOWN: PRELIMINARY REPORT ON A TEST OF EARLY CAPABILITY
S. M. Drezner and O. T. Gatto May 1965 74 p refs
(Contract NASr-21(08))
(RM-4565-NASA) CSCL 22D

A simulated automated adaptive countdown demonstration test patterned after the launch of Saturn I (SA-7) is described. Special input–output stations in the simulated countdown represent major countdown organizations such as the executive control, technical control, and technical action functions. Each station is capable of entering input information to the central processing unit (CPU) by alphanumeric and programmable keyboard, and to receive outputs on a cathode ray tube (CRT), a hard copy printer, and a special light panel. Each station can interrogate, command, and receive responses from the CPU for time, script event, status, and operational engineering information. Outputs from the CPU are in the form of CRT displays of the countdown script and time, time to launch, and graphic network displays of countdown. The countdown test contains historical data on tests and malfunctions available on request. A generalized activity network model, representing the countdown, offers displays of position in a network and provides a means for estimating the duration of a specified sequence of operations. R.N.A.

N65-28918# Army Engineer Research and Development Labs., Fort Belvoir, Va.
10-KW, 400-CYCLE, GASOLINE-ENGINE-DRIVEN GENERATOR SET USED IN THE RADIO TERMINAL (AN/TRC-80) FOR THE PERSHING MISSILE SYSTEM Engineering Evaluation Report
Richard N. Bait 12 Mar. 1965 40 p
(Rept.-1801; AD-462249)

The report covers the development, engineering design tests results, and evaluation of the 10-kw, 400-cycle, gasoline-engine-driven generator set used in the Radio Terminal (AN/TRC-80) with the Pershing Missile System. The report concludes that the generator set meets the technical objectives and electrical power requirements of the AN/TRC-80. Author

N65-28931# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Porz (West Germany). Institut für Angewandte Gasdynamik.
THE SUPERSONIC WIND TUNNEL AT THE DVL IN PORZ-WAHN [DIE UBERSCHALL-WINDKANAL-ANLAGE DER DVL IN PORZ-WAHN]
A. Naumann, A. Heyser, and G. Schulz May 1965 70 p refs In GERMAN; ENGLISH summary Available from Zentralstelle für Luftfahrtdokumentation und Inform. (ZLDI), Munich: 18, 70 DM

The report describes the history of planning, the conception and the technical lay-out of the new supersonic facility of the DVL at Porz-Wahn. The wind tunnels are of intermittent type. The air supply system consists of tanks of 400 m^3 with a maximal tank pressure of 60 atü, and of a vacuum sphere of 2000 m^3. The compressor aggregate requires an an electrical power of 7340 kW, the vacuum pumps 280 kW. The air is heated in storage-type heater systems. There are three supersonic tunnels. The test sections are 30 × 30 cm^2, and 60 × 60 cm^2 resp., the third one is a vertical free jet of 22 cm diameter. The Mach number can be varied between 0.4 and 6.3, resp. 0.4 and 5. Moreover, a gun-tunnel a plasma-low-density tunnel and a hypersonic tunnel are briefly described. An important part of the total facility is the instrumentation.

Author

N65-28943# Eastman Kodak Co., Rochester, N. Y. Apparatus and Optical Div.
PHOTOGRAPHIC LABORATORY, PORTABLE ES-39 (XH-1) Technical Report, Jan. 1963–Jun. 1964
Wright-Patterson AFB, Ohio. Systems Eng. Group, May 1965 132 p
(Contract AF 33(657)-10437)
(SEG-TR-65-13; AD-615619)

A study and prototype of a Portable Photographic Laboratory has been completed in response to Air Force Requirements. This laboratory is self-contained, providing its own power supply and environmental control system for worldwide application in support of the photographic processing equipment designed and developed as part of this project. The Processor is designed to process 9 3/8-inch paper and 16mm, 35mm, 70mm, 5-inch and 9 1/2-inch film, either singly or in multiple strands up to and including the 5-inch width. The Projection Contact-Printer is designed for contact printing, 2X enlarging, and optional automatic dodging or masking in either mode. Included are supporting items such as a Sensitometer, Densitometer, Rewinder-Viewer, and supplies required for a continuous operational period of twenty-four hours. Author

N65-28957*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
CHARACTERISTICS OF ENVIRONMENTAL TEST EQUIPMENT AT THE LANGLEY RESEARCH CENTER
Sherman A. Clevenson and Ian O. Mac Conochie Washington, NASA, Jul. 1965 47 p refs
(NASA-TM-X-1129) CFSTI: HC $2.00/MF $0.50 CSCL 14B

This paper contains a brief description of major, active environmental test equipment. Wind tunnels that provide some unusual environment are also described. A number of illustrations are shown as examples of the equipment. Author

N65-28958*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
CHARACTERISTICS OF MAJOR ACTIVE WIND TUNNELS AT THE LANGLEY RESEARCH CENTER
William T. Schaefer, Jr. Washington, NASA, Jul. 1965 46 p refs
(NASA-TM-X-1130) CFSTI: HC $2.00/MF $0.50 CSCL 14B

This report contains a brief description of each of the major active wind tunnels at the Langley Research Center. An illustration of each facility is provided. Author

12 FLUID MECHANICS

Includes boundary-layer flow; compressible flow; gas dynamics; hydrodynamics; and turbulence. For related information see also: 01 Aerodynamics; and 33 Thermodynamics and Combustion.

N65-28055 Joint Publications Research Service, Washington, D. C.
APPLICATION OF THE VOLTERRA METHOD TO THE SOLUTION OF CERTAIN PROBLEMS ON THE UNSTEADY MOTION OF AN IDEAL COMPRESSIBLE FLUID
I. G. Filippov *In its* Eng. J. 29 Jun. 1965 p 42–50 refs (See N65-28050 17-23) CFSTI: $6.00

A theoretical analysis of the two-dimensional problems of pressure penetration, and the penetration of a narrow and a blunt wedge into a layer of an ideal compressible fluid is presented, which demonstrates the applicability of the Volterra method to the solution of certain linear problems on the unsteady motion of an ideal compressible fluid. Also discussed is the applicability of the method to problems of: wave reflection from a rigidly moving barrier, the pressure of a stamp on a fluid layer, the compression of a fluid layer by blunt bodies, and analogous three dimensional problems. S.C.W.

N65-28058 Joint Publications Research Service, Washington, D. C.
ON THE TOTAL PRESSURE LOSSES IN A HYPERSONIC WIND TUNNEL
I. I. Mezhirov *In its* Eng. J. 29 Jun. 1965 p 62–70 refs (See N65-28050 17-23) CFSTI: $6.00

The magnitude of the total pressure recovery factor is studied theoretically for wind tunnels in which a thick boundary layer on the nozzle walls leads to momentum losses. In addition, wind tunnel with an Eifel chamber, and during start-up of the supersonic nozzle. J.M.D.

N65-28060 Joint Publications Research Service, Washington, D. C.
ON THE LAWS OF MOTION OF A VISCOUS GAS IN A SHOCK TUBE
A. I. Lashkov *In its* Eng. J. 29 Jun. 1965 p 78–88 refs (See N65-28050 17-23) CFSTI: $6.00

Slug length in the case of gas flow which is characterized by acceleration of the contact surface with simultaneous attenuation of the shock front is analyzed using shock tube data. It was found that the duration of the flow behind the shock front—the relative slug length—in a shock tube with Reynolds number less than 4000 depends on the Reynolds value. It appears that in the shock tube there are always gas flow regimes such that increase in the tube length does not increase the length of the slug. Comparison of two completely identical regimes of gas flow in shock tubes of differing diameters with Reynolds number less than 4000 showed that the absolute length of the slug is proportional to the square of the diameter. J.M.D.

N65-28072 Joint Publications Research Service, Washington, D. C.
FLOWS WITH CONSTANT DISCONTINUITY IN WHICH THE VELOCITY IS PROPORTIONAL TO THE DISTANCE TO THE CENTER OF SYMMETRY
V. A. Smirnov *In its* Eng. J. 29 Jun. 1965 p 213-215 refs (See N65-28050 17-23) CFSTI: $6.00

One-dimensional expansion of a two-layer flow into a vacuum is analyzed. It is assumed that the discontinuity between the layers is contact discontinuity, and that in the inner layer adjacent to the center of symmetry the sound speed is very high in comparison to its speed in the outer layer. An expression is derived for the pressure on the boundary between the layers which shows that pressure transition between the inner and outer layers is continuous. J.M.D.

N65-28074 Joint Publications Research Service, Washington, D. C.
A PROBLEM WITH INITIAL DATA FOR THE RELAXATION KINETIC EQUATION IN A UNIFORMLY EXPANDING (CONTRACTING) GAS
A. S. Borisov and F. G. Cheremisin *In its* Eng. J. 29 Jun. 1965 p 220–226 refs (See N65-28050 17-23) CFSTI: $6.00

The use of the simplified kinetic equations and the complex Boltzmann equation for the study of collision processes in gases is reviewed. Also, the problem of collision theory for a uniformly expanding or contracting gas is considered. It is shown that the difference in solutions by the Boltzmann equation and by a simplified kinetic equation, in which the collisions of the molecules are considered to be statistical, do not exceed the difference for the solution of problems of a gas with constant density and temperature. Although the final distribution is not Maxwellian, under certain limits for selected parameters relaxation to a Maxwellian distribution can be achieved. E.E.B.

N65-28184# Columbia Univ., Dobbs Ferry, N. Y. Hudson Labs.
VORTICITY DISTURBANCES IN A SHEAR FLOW Technical Report No. 117
Donald Koppel 12 Mar. 1965 17 p refs
(Contract Nonr-266(84))
(CU-141-65-ONR-266-Phys.; AD-614983)

A basic fluid flow wherein the vortex lines are stretched by the shear flow is defined. The small-disturbances from this basic flow are considered and the resulting set of equations reduced to an ordinary linear second order differential equation. This

differential equation is solved in various limiting cases. The case of vortex-line stretching is compared with the case when such stretching is absent. Author

N65-28229# Brown Univ., Providence, R. I. Div. of Engineering.
ON GAS DYNAMICS WITH NONEQUILIBRIUM RADIATIVE AND COLLISIONAL IONIZATION
Joseph H. Clarke and Carlo Ferrari (Politecnico di Torino) Apr. 1965 58 p refs
(Contract Nonr-562(35))
(Nonr-562(35)/8; AD-614641)

The dynamics of a gas undergoing nonequilibrium ionization by radiative and collisional transitions is formulated. The obtained nonequilibrium emission coefficient bears a significant relation to the equilibrium Planck function. The radiative contribution in the ionization rate equation can be put in the form of the divergence of a photon particle flux vector which parallels the radiative contribution in the energy equation. The ionization rates and emission and absorption coefficients are evaluated from statistical results available for the monatomic gas considered. Spectral complexities can be removed by expansion in terms of a large thermal parameter and a gas emerges which is gray above the edge frequency. The general theory is applied to the strong normal shock wave structured by the nonequilibrium ionization processes. The nature of this problem is examined, the complete structure is computed, the photoionization in the precursor portion of the shock structure is determined according to the black body emitter model for comparison, and the spectrum and directional approximation are assessed. R.N.A.

N65-28235# Naval Ordnance Test Station, China Lake, Calif.
FLOW NOISE INSIDE BOUNDARY LAYERS OF BUOYANCY-PROPELLED TEST VEHICLES
C. R. Nisewanger and F. B. Sperling Apr. 1965 38 p refs
(NAVWEPS-8519; NOTS-TP-3511; AD-615507)

Boundary-layer pressure fluctuations were measured at selected points along the surface of a free-rising buoyancy-propelled torpedo-shaped vehicle. The pressure spectra were obtained throughout the band from 200 cps to 30 kcps. The transition region was located and the cross-correlation of noise pressure and shell vibration velocity in the laminar region was determined. Space–time correlation was obtained for closely spaced transducers to show the lifetime, correlation length, and convection velocity of turbulent disturbances. The effect of finite transducer size on the measured pressure was determined. Author

N65-28240# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RESISTANCE CRISIS OF THE DIFFUSER
A. I. Lashkov 21 Apr. 1965 10 p refs Transl. into ENGLISH from Inzh. Zh. (USSR), v. 2, no. 2, 1962 p 365–368
(FTD-TT-64-1202/1+2; AD-615236)

The character of the change in the dependence of the resistance of the diffusers with great angles of opening on the Re number is brought about by the same principles as for the bodies around which flow is difficult. In the diffuser with a great angle of opening there is possible the realization of a system of flow which is characterized by a crisis of resistance. The relative roughness of the walls in the region of the input flow for the diffuser with great angles of opening proves to be an unavoidable criterion of similarity. Author

N65-28338# Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
BASIC STUDIES OF ROTATING STALL AND AN INVESTIGATION OF FLOW INSTABILITY SENSING DEVICES Semi-annual Progress Report, Jan.–Jun. 1964
Jul. 1964 61 p refs
(Contract AF 33(615)-1240)
(CAL-DF-1901-S-2; AD-463080)

The problem of predicting separation of a laminary boundary layer on a moving wall and the effects of entering swirl patterns on rotating cylinders are discussed. Calculations of the boundary layer on a downstream-moving wall were performed. The wall shear on a downstream-moving wall is related to the position of the wall and the pressure distribution by a nonlinear total differential equation. Also, the re-examination of experimental data suggests that some of the velocity profiles measured on an upstream-moving wall were made in a thin laminar separation bubble, not in an unseperated laminar boundary layer as had previously been assumed. Evidence to support this suggestion is presented and additional experiments are proposed. Input requirements of the flow instability sensor total pressure probe were defined; and the construction of a variable geometry distable amplifier, a preliminary design of a flow modulator, and the initial static characteristic tests of the amplifier were completed. E.E.B.

N65-28469# National Aerospace Lab., Tokyo (Japan).
THE EXPERIMENTAL AND THEORETICAL STUDIES OF TRANSONIC PANEL FLUTTER
Takao Ishii and Mitsunori Yanagizawa 1964 64 p refs In JAPANESE; ENGLISH summary
(NAL-TR-74)

The solution of the linearized differential equation of unsteady transonic flow is obtained for arbitrary time dependent motion of thin bodies. And the characteristics of the linearized theory are examined closely from the view point of physical understanding of acoustic wave propagation. By applying this result to the panel flutter problem, the flutter boundary of two dimensional panels, which are simply supported at the leading and trailing edges, is obtained through the Galerkin method with three modes analysis. These results are compared with the theoretical results for the low supersonic panel flutter obtained by several authors, and also compared the experimental results for the panels clamped at the leading and trailing edges of our own experiment. Our studies reveal that the critical panel thickness ratio (thickness to length) in transonic flow also remains in the finite (non-zero nor infinite) value. Author

N65-28470# National Aerospace Lab., Tokyo (Japan).
ON THE INITIAL-VALUE PROBLEM IN STATISTICAL HYDROMECHANICS: A GENERAL SOLUTION OF THE HOPF CHARACTERISTIC FUNCTIONAL EQUATION
Iwao Hosokawa 1964 15 p refs In JAPANESE; ENGLISH summary
(NAL-TR-75)

The aim of this report is to point out that a general solution of the Hopf Φ equation in turbulence theory consists already in his "definition" of the characteristic functional, and it is equivalent to Rosen's solution. In addition, the decay of isotropic turbulence is considered based upon the present integral representation (originated with Hopf). In the limit when viscosity is so large that the non-linear term is neglected in the Navier-Stokes equation, the functional integration is completely well handled, bringing forth the well-known decay law of weak turbulence; while in the opposite limit, only the same formal result as Rosen gave can be deduced at the present stage. Author

N65-28514# Bureau d'Analyse et de Recherche Appliquees, Issy-les-Moulineaux (France).
ANALOG STUDY OF HYDROFOILS NEAR THE FREE SURFACE
Daniel Fruman Feb. 1965 79 p refs
(Contract N62558-4113)

A method for designing supercavitating hydrofoils near the free surface is presented in which the calculations are based on the distribution of the pressure on the lower surface of the foil. This pressure distribution is equivalent to a vortex distribution located on the projection of the foil in the direction of uniform flow. It is assumed that a cavitation pocket is formed at the leading edge and extends some distance downstream. It is also assumed that the perturbations of the uniform flow due to the hydrofoil are relatively small, which makes it possible to develop the design equations by means of the bidimensional small perturbations theory; the resulting mathematical model is easily solved by means of the method of analog computation. J.M.D.

N65-28535# California Inst. of Tech., Pasadena. Hydrodynamics Lab.
GENERAL FORMULATION OF A PERTURBATION THEORY FOR UNSTEADY CAVITY FLOWS
D. P. Wang and T. Yao-tsu Wu Mar. 1965 23 p refs
(Contract Nonr-220(35))
(Rept.E-97.7)

The problem of a two-dimensional cavity flow of an ideal fluid with small unsteady disturbances in a gravity free field is considered. By regarding the unsteady motion as a small perturbation of an established steady cavity flow, a fundamental formulation of the problem is presented. It is shown that the unsteady disturbance generates a surface wave propagating downstream along the free cavity boundary, much in the same way as the classical gravity waves in water, only with the centrifugal acceleration owing to the curvature of the streamlines in the basic flow playing the role of an equivalent gravity effect. As a particularly simple example, the surface waves in a hollow potential vortex flow is calculated by using the present theory. Author

N65-28650# Oceanics, Inc., Plainview, N. Y.
EXPERIMENTAL MODEL STUDIES OF THE DYNAMIC VELOCITY FLUCTUATIONS EXISTING IN THE AIR WAKE OF AN AIRCRAFT CARRIER. PART I: TEXT
August F. Lehman and Paul Kaplan Mar. 1965 85 p refs
(Contract Nonr-4186(00))
Rept. 65-21; Pt. 1; AD-614672)

Experimental investigations were undertaken in a water tunnel to measure the dynamic horizontal and vertical velocity fluctuations existing in the air wake of a carrier and encountered by landing aircraft. A description of the instrumentation developed, and an analysis of the methods employed in converting data to pitch transfer functions (amplitude and phase) is given together with the determination of power spectra information. Conclusions regarding instrumentation, test data interpretation and operational procedures for the carrier and aircraft are presented. Author

N65-28864# Harry Diamond Labs., Washington, D. C.
ATTEMPTS TO CALCULATE MOVING STRIATIONS
Alford L. Ward 15 Feb. 1965 28 p refs
(HDL-TR-1276; AD-614647)

An existing computer program has been used in an attempt to understand moving striations in gas discharge tubes. The large disparity between electron and ion mobilities and the steep field-gradient in the cathode-fall region, often leading to negative fields, have prevented a full test of the model. However, computations indicate that the quasi-static voltage of a low-pressure, abnormal glow-discharge is a strong function of the ion distribution in the cathode-fall region. This effect is equivalent to a dynamic negative resistance; low-frequency oscillations are built up similar to the relaxation oscillations that occur when the static voltage-current characteristic has a negative slope. Another type of calculation has been made by neglecting electron transport properties and by using a sinusoidal increment in the applied voltage. These calculations were made in the subnormal-glow region without fully formed cathode-fall and positive-column regions. Higher ionization on the leading (cathode) edge of the ion density maxima is shown to result in the maxima moving toward the cathode with an augmented velocity. Calculations are continuing. Author

N65-28691*# Sperry Utah Co., Salt Lake City, Utah.
ANALYTICAL INVESTIGATION OF FLUID AMPLIFIER DYNAMIC CHARACTERISTICS, VOLUME I
F. R. Goldschmied, D. L. Letham, C. E. Pearson, R. E. Esch, T. J. Lechner (Johnson Serv. Co., Milwaukee) et al Washington, NASA, Jul. 1965 210 p refs
(Contract NAS8-11236)
(NASA-CR-244) CFSTI: HC $6.00/MF $1.25 CSCL 20D

Fluid amplifier dynamic characteristics were investigated. A Fortran program was prepared and a computer run made for an initial simplified flow field, for seeking the numerical solution of the time-dependent incompressible two-dimensional Navier–Stokes equations for the case of a viscous jet in an arbitrary flow field. It was shown that streamline patterns can be obtained and interpreted physically for a sequence of time points. In another investigation, preliminary experimental results on a test circuit for establishing realistic dynamic test standards for fluid digital amplifiers indicate that the proposed test standards are practical and useful. Also investigated was a theoretical analysis of a passive circuit consisting of a volume-terminated transmission tube (for a viscous compressible fluid), along with an electrical analogy, and an experimental study of the feasibility of a fluid control subsystem for a hybrid thrust-vector-control servosystem. Presented in support of the analyses are streamline flow pattern diagrams, graphs, and oscilloscope photos. L.S.

N65-28692*# Sperry Utah Co., Salt Lake City, Utah.
ANALYTICAL INVESTIGATION OF FLUID AMPLIFIER DYNAMIC CHARACTERISTICS, VOLUME II
F. R. Goldschmied, H. L. Fox, and D. L. Letham Washington, NASA, Jul. 1965 207 p refs
(Contract NAS8-11236)
(NASA-CR-245) CFSTI: HC $6.00/MF $1.25 CSCL 20D

Those aspects of dimensional analysis and similarity which are of most pertinence to fluid circuitry are discussed. The equations of fluid flow through both orifices and circular tubes are given and discussed. The equivalent parameters of passive fluid elements are presented, both steady-state and small-signal. The instrumentation of fluids is discussed both for steady-state and time dependent measurements. Typical active devices are described, discussed, and compared. Specific attention is given to the impact modulator and its use in operational amplifiers. An equivalent circuit for the impact modulator is found. The subject of circuit synthesis, and particularly transfer function synthesis, is discussed. The requirements of proportional fluid circuitry is discussed, and the use of equivalent circuits in the analysis of fluid circuits is presented through the discussion of

specific circuits. Both steady-state and time varying examples are given. The loop transfer function of an idealized, but typical, fluid control circuit is presented and analysed by the use of a Bode plot. Author

N65-28720# California Univ., Los Angeles. Aerosonics Lab.
AN AEROSONICS BIBLIOGRAPHY, SUPPLEMENT NO. 2
Alan Powell and Louis Solomon Apr. 1965 28 p refs
(Contract Nonr-233(62))
(Rept.-65-3; AD-614594)

N65-28825# Lockheed Missiles and Space Co., Sunnyvale, Calif.
ON THE FLOW IN THE NEIGHBORHOOD OF THE INTERSECTION OF A SONIC LINE AND A COMPRESSION SHOCK
Iu. B. Lifshits [1964] 7 p refs Transl. into ENGLISH from Inzh. Zh. (USSR), v. 5, no. 1, 1965 p 29–34

It has been previously established that the continuous flow in a local supersonic zone arising in subsonic flow around a profile is not stable. A compression shock, closing off the domain of local supersonic velocities, forms in such a flow. The compression shock which has been assumed to occur on the line of transition through the sonic velocity is discussed. In the solution presented the compression shock occurs at the point of the sonic line if a finite discontinuity of the first derivatives in the velocity-vector components or an infinite discontinuity of their second derivatives falls at this point. In the case of an incident higher order discontinuity, a discontinuous solution was not found successfully. This permits the assumption that a closing compression shock does not occur on the transition line in the local supersonic zone in flow around a smooth profile. Only a sufficiently strong disturbance can cause a shock-wave to arise directly at the sonic line. E.E.B.

N65-28827# Lockheed Missiles and Space Co., Sunnyvale, Calif.
ON ERRORS IN THE PLANE LAYER APPROXIMATION IN DESCRIBING RADIATION IN THE BOUNDARY LAYER OF A GREY GAS
V. P. Zamuraev [1964] 4 p ref Transl. into ENGLISH from Prikl. Mekhan. i Tekhn. Fiz. (USSR), no. 1, 1965 p 125–127

An estimate is made of the error when radiation is considered in the plane-layer approximation for the boundary layer around a flat plate in the longitudinal flow of a radiating-absorbing grey gas with a constant temperature outside the boundary, but with an arbitrary, although constant, absorption coefficient. The problem is two-dimensional. The presence of local thermodynamic equilibrium is assumed; scattering of the radiation is neglected. Under the assumptions made, the term in the energy equations associated with the radiation is expressed in terms of the radiation density. Equations are derived in which the error, due to use of the plane-layer approximation, does not exceed in order of magnitude the error admitted in the energy equation. Conditions for applicability of the plane-layer approximation are considered. M.R.W.

N65-28830# Lockheed Missiles and Space Co., Palo Alto, Calif.
NONEQUILIBRIUM SUPERSONIC AIR FLOW AROUND A SPHERE
V. P. Stulov and G. F. Telenin [1965] 19 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Otn. Mekhan., (Moscow), no. 1, 1965 p 3–16

A solution is presented for the problem of nonequilibrium supersonic air flow around a sphere. The problem was solved by the method previously developed for the computation of the flow around blunt bodies by the supersonic flow of a gas with arbitrary thermodynamic properties. E.E.B.

N65-28915*# National Aeronautics and Space Administration, Washington, D. C.
THE DECOMPOSITION OF A VISCOUS FUEL FILM IN AIR [K RASPADU PLENKI VYAZKOGO TOPLIVA V VOZDUKHE]
A. S. Lyshevskiy Apr. 1965 16 p refs Transl. into ENGLISH from Tr. Novocherk. Politekhn. Inst. (Novocherkassk), no. 33/47, 1956 p 228–238
(NASA-TT-F-335) CFSTI: HC $1.00/MF $0.50 CSCL 20D

The instability and the criteria for decomposition of a viscous fuel film in air, based on consideration of the unstable waves arising on the surface of separation are established. Author

N65-28919# Oklahoma Univ., Norman. Graduate College.
EVALUATION OF THE CAPILLARY-ORIFICE MODEL OF HIGH-SPEED FLOW THROUGH POROUS MEDIA
John Earl West (M.S. Thesis) 1965 51 p refs
(AD-614671)

The primary purpose was to determine whether the 'capillary-orifice model' would give experimental results that correlate to the flow through the media. The models under test were constructed from acrylic plastic tubing and 0.125-in. acrylic plastic sheet. Excellent correlation was obtained for Reynolds numbers greater than 1000. With a model of 0.50-inch tube diameter, the ratio of orifice diameter to tube diameter desired was 0.72. The ratio of orifice diameter to tube diameter would seem to be satistically related to the pore size distribution. A Fortran program is given for use in data reduction with two mass-indicating flowmeters (TAB)

N65-29033# Tokyo Univ., (Japan). Inst. of Space and Aeronautical Science.
DIFFRACTION OF A PLANE SHOCK WAVE AROUND A CORNER
Koichi Oshima, Katsutaka Sugaya, Masao Yamamoto, and Toshio Totoki Jan. 1965 31 p refs *Its* Vol. 30, No. 2 (ISAS-393)

Diffraction of a plane shock wave around a sharp convex 90° corner was observed in a shock tube flow with the various shock Mach numbers from 2.8 to 1.5. The shock wave shape observed showed quantitative difference from the theoretical predictions, which are derived from the one-dimensional flow theory and the ray-shock theory. Considering the possible cause of this discrepance, it is suggested, the shear stress due to turbulent-like mixing between the ray tubes immediately behind the shock front may play an important role in this phenomenon. On the basis of the concept of the turbulent mixing length, a generalized theory, which includes this shear effect, is proposed and a linearized solution of this equation is obtained. The predicted results show good agreement with the experimental data. Author

N65-29081# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CALCULATION OF AXIALLY SYMMETRIC VORTEX FLOW OF AN INVISCID COMPRESSIBLE FLUID IN RADIAL TURBO-MACHINES

Ya. A. Sirotkin 15 Apr. 1965 27 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Mekhan. i Mashinostr. (USSR), no. 3, 1963 p 16–28
(FTD-MT-64-457; AD-614940)

The formulation of a direct axially symmetric problem for a compressible fluid is considered taking into account losses due to friction and mixing. This problem is set up as a boundary value problem in a channel. TAB

N65-29107# Payne (Peter R.), Inc., Rockville, Md.
CURVED JET FLOWS, VOLUME I
Peter R. Payne et al Ft. Eustis, Va., Army Aviation Mater. Labs., May 1965 152 p ref
(Contract DA-44-177-AMC-238(T))
(USAAML-TR-65-20, Vol. I; AD-616357)

A simple equation is derived to describe curvilinear flow, and this is then applied to various practical problems. In the case of annular jet flow, previous theories are shown to be approximate solutions to the general equation; the more exact solution of this report is shown to give better agreement with experiment. The new theory is also applied to the flow of air in a curved duct, the flow into an intake, the jet flap, and Coanda flow. Comparison with experiment again gives good agreement. Because curvilinear flow implies diffusion, the theory of diffusion is studied in some detail, and a general theory is developed for the total head lost in a rapid diffusion. When applied to the diffusion loss measured in the nozzle of an annular jet, and the analogous losses in a curved duct, the theory gives excellent agreement with experiment. The various investigations cover fairly wide areas in subsonic aerodynamics. Thus, it has proved impossible to work out the applications of the theory completely for all the cases considered. The same is true of the experimental work reported, and further work in both areas is suggested. Author

N65-29108# Payne (Peter R.), Inc., Rockville, Md.
CURVED JET FLOWS, VOLUME II
Peter R. Payne et al Ft. Eustis, Va., Army Aviation Mater. Labs., May 1965 45 p refs
(Contract DA-44-177-AMC-238(T))
(USAAML-TR-65-20, Vol. II; AD-616395)

A simple equation is derived to describe curvilinear flow, and this is then applied to various practical problems. In the case of annular jet flow, previous theories are shown to be approximate solutions to the general equation; the more exact solution of this report is shown to give better agreement with experiment. The new theory is also applied to the flow of air in a curved duct, the flow into an intake, the jet flap, and Coanda flow. Comparison with experiment again gives good agreement. Because curvilinear flow implies diffusion, the theory of diffusion is studied in some detail, and a general theory is developed for the total head lost in a rapid diffusion. When applied to the diffusion loss measured in the nozzle of an annular jet, and the analogous losses in a curved duct, the theory gives excellent agreement with experiment. The various investigations cover fairly wide areas in subsonic aerodynamics. Thus, it has proved impossible to work out the applications of the theory completely for all the cases considered. The same is true of the experimental work reported, and further work in both areas is suggested. Author

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N65-29128# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ENERGY CHARACTERISTICS OF CURVI-AXIAL DIFFUSERS
N. D. Polotskiy 16 Jan. 1965 17 p refs Transl. into ENGLISH from Energomashinostroyeniye (Moscow), no. 3, 1964 p 12–16 (FTD-TT-64-711/1+2; AD-610786)

In determining flow structure in diffuser channels of multistage pump outlets, variants of flat diffusers were investigated on an air model. The test device had organic glass upper and lower plates, and changeable wooden walls. Cylindrical fittings for measuring velocity and pressure in two intermediate sections were mounted in the upper plate. Flow was tested in curvi-axial diffusers. Expressions for kinematic, potential, and flow energy are given, and the process of energy transformation is shown on graphs. Test results showed that a rectilinear section behind the diffuser improves its energy qualities, while a curvilinear section reduces energy characteristics. For a curvi-axial diffuser the outflow velocity is greater than the input velocity. C.T.C.

N65-29129# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHOD OF AUTOMATIC MEASUREMENT OF MASS FLOW OF LIQUIDS OR GASES AND A DEVICE FOR ITS ACCOMPLISHMENT
B. N. Petrov, G. P. Katys, and V. M. Il'inskiy 18 Jan. 1965 6 p Transl. into ENGLISH from Soviet Patent No. 157519 (Appl. No. 693448/26-10, 14 Jan. 1965 6 p
(FTD-TT-64-725/1+2; AD-610370)

In the proposed method, the mass-flow ratio is determined with the magnitude of the torsional moment which is a function of the mass-flow ratio, in order to decrease the required energy. An element is elastically connected with the rotor of the turbo-machine and gives the flow an angular velocity. For greater precision, the operating and measuring function are in one unit. Equations describing motion of the turbo-machine are given, and integral parts of the machine and their functions are described. A method for decreasing viscous friction on the vane wheel is also given. C.T.C.

13 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; oceanography; cartography; and geodesy. For related information see also: 20 Meteorology; 29 Space Radiation; and 30 Space Sciences.

N65-28100# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PENDULUM WITH LIQUID FILLER-INSTRUMENT TO DEMONSTRATE DIURNAL ROTATION OF THE EARTH
V. Ya. Gavrik 17 Dec. 1964 9 p refs Transl. into ENGLISH from Usp. Fiz. Nauk (Moscow), v. 81, no. 4, 1963 p 774–777
(FTD-TT-64-539/1+2; AD-610409)

To demonstrate the diurnal rotation of the earth the problem consists in the creation of pendulums, sensitive to the action of Coriolis force. A method is described for increasing the quality of pendulums with solid loads, intended to demonstrate the diurnal rotation of the earth, by using in them nonwettable liquids with a free surface. The combinations suggested were the use of mercury, having greater specific weight, and table tennis balls. Instructions for constructing the pendulum are presented. A schematic drawing of a pendulum with component load is shown. The pendulum with liquid filler has the ability of accumulating the actions of small Coriolis accelerations, detecting the effect of Coriolis force on liquid-solid pendulum load, demonstrating its effect on a solid load. It appears to be a peculiar compass, indicating direction, perpendicular to true (geographic) meridian. N.E.A.

N65-28115# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON A METHOD OF MICROMORPHOLOGICAL INVESTIGATION OF SOILS ON SLIDES
K. N. Fedorov 15 Jan. 1965 11 p refs Transl. into ENGLISH from Nauchn. Dokl. Vysshei Shkoly, Biol. Nauki (Moscow), no. 3, 1963 p 199–204
(FTD-TT-64-855/1+2; AD-610374)

In developing methods of micromorphological soil investigations on slides in unperturbed composition, the features of the slide as a compound and of the microscopical structure of the examined soil, as well as its horizons and the purpose of the investigation, should be considered. The importance of preparing repetition slides is emphasized; for example, the micromorphological structure of the same section of turf-podzolic average silica soil horizon is different in the vertical and horizontal sections. The suggestion is made that repeated slides should be prepared from analogous, monotypical micro zones, with each batch accompanied by a description of the microstructure from which it was prepared, and by an indication of the relative area of similar micro zones in the sample and in the soil profile. The advisability of observing all stages of slide preparation in studying surface phenomena on mineral grains, pores, cracks, and structural aggregate is pointed out.
M.G.J.

N65-28165# Army Engineer Research and Development Labs., Fort Belvoir, Va.
CHECKING THE ACCURACY OF GEODETIC MEASUREMENTS
N. G. Vuduyev [1964] 8 p Transl. into ENGLISH from Geodez. i Kartograf. (Moscow), no. 7, 1964 p 11–13
(T-1764; AD-610475)

The problem of computing the necessary number of measurements needed and determining the permissible mean square error is considered for estimating the accuracy of geodetic measurements. It is assumed that systematic errors have been eliminated from the measurements, and that the distribution of random errors obeys the normal law. By testing a hypothesis, it is possible to find the probabilities that (with certain assumptions) high quality measurements will be rejected and unsuitable ones accepted.
L.S.

N65-28172# Hawaii Inst. of Geophysics, Honolulu.
EARTHQUAKES LOCATED BY T PHASES DURING THE VELA UNIFORM ALEUTIAN ISLANDS EXPERIMENT, 1964 Technical Summary Report No. 7
Rockne H. Johnson Dec. 1964 32 p refs
(Contract Nonr-3748(01); ARPA Order 218-62)
(HIG-64-23; AD-610747)

This report tabulates sources and strengths of earthquake T phases recorded by hydrophone net during the VELA UNIFORM Aleutian Islands Experiment. In a thirty-seven day period, 654 earthquake locations were found for the entire Pacific, of which 184 were in the Aleutians. Comparison of T-phase strengths with earthquake magnitudes suggest a threshold about magnitude three for location by hydrophone net.
Author

N65-28182# General Dynamics Corp., San Diego, Calif. General Atomic Div.
FALLOUT STUDIES: CLOUD CHEMISTRY Final Report
J. H. Norman, P. Winchell, W. E. Bell, and A. B. Riedinger 29 Jan. 1965 62 p refs
(Contract OCD-PS-64-222)
(GA-6094; AD-614997)

A study of high-temperature silicate absorption of fission products under equilibrium conditions has been performed. Evaluation of diffusion coefficients for important fission products in molten silicates by both ordinary and novel techniques has been accomplished. Mass spectrometric investigations of gaseous species and associated thermodynamics for fission-product oxides and major soil constituents have been performed. A study, using electron microprobe apparatus, of how various elements are distributed in actual fallout particles has been initiated. Consideration has been given to how the phenomena observed might fit into the process of fallout formation.
Author

N65-28242# Alaska Univ., College. Geophysical Inst.
NOCTILUCENT CLOUDS. A SURVEY WITH SPECIAL REFERENCE TO RECENT OBSERVATIONS
Benson Fogle, Sydney Chapman, and Carol Echols Mar. 1965 47 p refs
(Grant NSF GP-1759)
(UAG-R-162)

A survey of recent observations of noctilucent clouds is presented. Included are discussions of the Northern Hemisphere network of meteorological stations observing conditions, 1964 observations, spatial extent, height, velocity, wave structure, thickness and vertical amplitude, yearly variation, nature of the cloud particles, polarization and spectral measurements, artificial cloud experiments, Southern Hemisphere observations, theory, and meteorological interest.
R.N.A.

N65-28511# Centre National de la Recherche Scientifique, Paris (France). Aerothermic Lab.
CALCULATIONS OF THE TRAIL OF A WEB OF WIRES IN A SPECIAL CIRCUMSTANCE OF RAREFIED ATMOSPHERE [CALCUL DE LA TRAINEE D'UN RESEAU DE FILS DANS UN CAS PARTICULIER D'ATMOSPHERE RAREFIEE]
Michel Giat Mar. 1965 23 p refs In FRENCH
(Rept.-65-3)

Calculations are made to determine the wake of a mesh network under the conditions of low speed, rarefied atmosphere, and in an intermediate region. These calculations are only valid for weak interactions where the applicable perturbation is of an infinitely small first order compared to the local speed. The method of calculation abandons Stokes Theorem with its discontinuity at a point representing the obstacle and instead deduces the wake from a determination of the modification of the vector field of velocity created by the mesh.
Trans. by J.G.

N65-28517# Brussels Univ. (Belgium).
DYNAMICS AND ENERGETICS OF THE CIRCULATION ON A LARGE SCALE [LA DYNAMIQUE ET L'ENERGETIQUE DE LA CIRCULATION A GRANDE ECHELLE]
Jacques M. Van Mieghem Paris, Centre Natl. d'Etudes Spatiales [1965] 66 p refs In FRENCH Presented at the Meeting on Meteorol. Probl. of the Stratosphere and Mesosphere, 8–12 Mar. 1962

This report describes the large scale perturbations which play an essential role in the middle and higher stratosphere (30–60 km), in regard to the thermal economy and balance sheet of kinetic motion; a similar role is played by the same perturbations in the troposphere. The role of meridional circulations thus appears to be secondary, although no generalizations can be drawn from these circulations, especially at low altitudes. As a result the static stability which is especially strong in the stratosphere does not prevent the formation of large scale perturbations in this part of the atmosphere.

Because of this stability, it is likely that the large scale stratospheric perturbations have horizontal dimensions greater than in the troposphere and mesosphere. Transl. by J.G.

N65-28601# Little (Arthur D.), Inc., Cambridge, Mass.
INFRA-RED SPECTRAL PROPERTIES OF HIGH-ALTITUDE CLOUDS Final Report
Henry H. Blau, Jr. and Ronald P. Espinola Jun. 1965 125 p refs
(Contract Nonr-3556(00))
(AD-465937)

The results of an experimental program for the measurement of the spectral scattering properties of high-altitude sunlit clouds, in the 1.2 to 3.6 micron region, are described. Reflection spectra of a variety of cloud types and cloud altitudes were obtained for scattering angles from 50° to 150° by means of a U-2-borne infrared spectrometer. The scattering characteristics of both liquid water and ice clouds vary appreciably from 1.2 to 3.6 microns, in a manner that can be related to the bulk absorption properties of both substances. The dependence of cloud scattering efficiency on scattering angle is small, except in absorption bands, where it is very pronounced. Ice clouds show strong scattering minima at 1.5μ and 2.0μ which are not present in water cloud spectra. However, the scattering properties of both ice and water clouds are very similar in the 2.7μ region. Author

N65-28620# Lockheed Missiles and Space Co., Sunnyvale, Calif.
TRANSMISSION THROUGH EXTREME MODEL ATMOSPHERES
L. L. List and G. E. Oppel 15 Sep. 1964 91 p refs
(Contract AF 04(647)-787)
(LMSC-A701650; AD-615201)

The transmission of infrared energy in the 2.5- to 3.1-micron spectral region has been calculated for four model atmospheres representing average and extreme latitudinal and seasonal variations. Transmission values are shown for slant paths outward through the earth's atmosphere as a function of zenith angle and starting altitude of the ray path. Values have been calculated, using the Elsasser and Goody absorption-band models, for absorption by carbon dioxide and water vapor, respectively. The spectral resolution is approximately 0.006 micron. From altitudes above 10 km., maximum transmission is obtained through the tropical model atmosphere and minimum transmission is obtained from the arctic summer model. From altitudes below 10 km., the extreme atmospheres are the arctic winter model (maximum transmission) and the tropical model (minimum transmission). Author

N65-28622# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TILTMETER OBSERVATIONS AT THE "APATITY" SEISMIC STATION IN 1959–1960
G. D. Panasenko 29 Apr. 1965 14 p ref Transl. into ENGLISH from Sovremennyye Dvizheniya Zemnogo Kory, Sb. Statey, Akad. Nauk SSSR, No. 1, 1963 p 202–210
(FTD-TT-64-1262/1+2; AD-615244)

On the basis of the inclination data obtained at the Apatiti seismic station by an azimuth installation that consists of a number of the H - VI type inclination meters there have been observed some periodic variations of the earth surface inclinations and a linear component apriorily related in its main part to the 'secular' course. The daily inclination course is generally small and does not exceed 0.04 sec. of arc. In some cases semi-diurnal inclinations not exceeding 0.002 sec. of arc may be distinguished against the background of the daily course. The annual inclination course of 1960 along the N–S component is 2.6 sec. of arc and along the W–E is 0.7 sec. of arc. Against the background of the annual course there may be strictly distinguished a wave of inclinations with a period of 4.0–4.5 months and an amplitude of about 1.3 sec. of arc along the N–S and nearly 0.35 sec. of arc along the W–E. In the upheaval azimuth of 339 degrees, which is directed towards the uplift of the earth's crust, the 'secular' inclination course of 1960 comprises 6.56 sec. of arc. Author

N65-28633*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IONOSPHERE TOPSIDE SOUNDER STUDIES. 1: THE REDUCTION OF ALOUETTE I IONOGRAMS TO ELECTRON DENSITY PROFILES
J. O. Thomas, B. R. Briggs, L. Colin, M. J. Rycroft, and Margaret Covert Washington, NASA, Jul. 1965 50 p refs
(NASA-TN-D-2882) CFSTI: HC $2.00/MF $0.50 CSCL 04A

In radar soundings of the topside of the ionosphere, an ionosonde in a vehicle immersed in the plasma above the peak of the F2 layer measures, as a function of frequency, f, the virtual depth, h', below the vehicle, at which radio waves are reflected from the topside of the ionosphere. In this report, a number of mathematical procedures and digital computer programs for converting the observed topside h'(f) curves into electron density profiles are described. Author

N65-28637*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IONOSPHERE TOPSIDE SOUNDER STUDIES. II: THE CALCULATION OF THE ELECTRON DENSITY AND THE MAGNETIC FIELD PARAMETERS AT THE ALOUETTE I ORBIT
J. O. Thomas, M. J. Rycroft, Margaret Covert, B. R. Briggs, and L. Colin Washington, NASA, Jul. 1965 19 p refs
(NASA-TN-D-2921) CFSTI: HC $1.00/MF $0.50 CSCL 04A

In a companion report by Thomas et al., 1965, a number of digital computer programs for reducing Alouette I topside ionograms to electron density profiles were described. These computations can only be carried out accurately if the electron number density and the strength and direction of the earth's magnetic field are known at the vehicle at the time when the ionogram was made. It is the purpose of this report to describe a digital computer program by means of which these quantities can be determined from the Alouette I orbital data and from a measurement of the frequency at which the extraordinary trace on the ionogram has zero range. The errors involved in the observations and in the calculations are discussed and examples given of some typical results showing the variation of the electron density in the neighborhood of the satellite as a function of time and location. Author

N65-28646# Woods Hole Oceanographic Institution, Mass.
IMPROVEMENTS ON THE RONNE SYSTEM OF CLOUD MEASUREMENTS FROM AIRCRAFT MOTION PICTURE FILMS
Andrew F. Bunker Mar. 1965 21 p ref
(Grant NSF G-22389)
(TR-1; AD-614614)

In 1959 Ronne developed a system of measuring film taken by a time-lapsed motion picture camera mounted in an aircraft so that cloud heights and distances could be computed. The measurement system has been redesigned and a Fortran program has been written for the computation of distances

and heights. Utilizing the phenomenon that the bases of cumulus clouds in a given air mass have nearly the same height, a method of determining the level line when the horizon is obscured by haze or clouds has been devised and incorporated into the program. Author

N65-28683# Kiruna Geophysical Observatory (Sweden).
ON THE AMPLIFICATION OF ELF EMISSIONS BY CHARGED PARTICLES IN THE EXOSPHERE, WITH SPECIAL REFERENCE TO THE FREQUENCY BAND AROUND THE PROTON CYCLOTRON FREQUENCY Scientific Report No. 2
Bengt Hultqvist Jan. 1965 18 p refs *Its* Scientific Report No. 2
(Contract AF 61(052)-619)
(AFCRL-65-166; AD-614620)

Using a collisionless warm-plasma model having different temperatures along and perpendicular to the geomagnetic field, and a macroscopic drift along the field lines, possible amplification and absorption mechanisms for transverse waves propagating along the field lines were investigated with particular regard to frequencies near the proton cyclotron frequency. The only ELF emissions which readily may be amplified in the exosphere are those of right-handed polarization. Streaming protons may cause the amplification. High-energy electrons, streaming along the magnetic field lines in a direction opposite to that of the wave propagation, may absorb such ELF emissions, though only if the refractive index conforms to highly restrictive desiderata. ELF emissions of left-handed polarization may be amplified by high-energy electrons. For this, however, the demands on the refractive index are such that it is questionable if amplification at frequencies close to the proton cyclotron frequency can take place anywhere in the ionosphere or the exosphere. On the other hand, such emissions will be readily absorbed by the protons existing in the exosphere and the ionosphere. Author

N65-28696# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CAN WE DETECT GRAVITATIONAL WAVES?
M. A. Korets 23 Apr. 1965 6 p ref Transl. into ENGLISH from Priroda (Moscow), no. 7, 1964 p 106–108
(FTD-TT-64-1238/1; AD-615287)

A discussion is presented on a method of detecting gravitational waves and the sufficient sensitivity of such a method. For detecting gravitational waves one has to measure the different forces of gravitation at two different points, that is, it is necessary to have two test masses and measure the difference in the force acting on them or measure the change in the distance between the test masses brought about by this change. The length of the gravitational wave brought about the relative movements of some massive heavenly bodies is very great. Therefore, the greater the distance between the test masses the greater the difference in forces will be. The limit to the difference of the test bodies gives the condition of the experiment. Experiments performed on detecting gravitational waves are discussed. N.E.A.

N65-28780# RAND Corp., Santa Monica, Calif.
COMPUTATIONAL SOLUTION OF RADIATIVE TRANSFER PROBLEMS IN CLOUD PHYSICS
R. Bellman, H. Kagiwada, R. Kalaba, and S. Ueno (Kyoto Univ.) May 1965 13 p refs
(P-3125; AD-615423)

Multiple scattering of light in clouds is dealt with. Highly anisotropic transfer problems are treated as one step toward the determination of the structure and dynamics of clouds based on experimental measurements. Radiation fields for isotropic and anisotropic scattering are determined. Author

N65-28810# Alaska Univ., College. Geophysical Inst.
SUMMARY OF NOCTILUCENT CLOUD REPORTS FROM 1885–1964
Benson Fogle and Carol Echols Jun. 1965 30 p refs
(Grant NSF-GP-1759)
(Rept.-3)

A summary of 1034 Northern Hemisphere and 8 Southern Hemisphere noctilucent cloud (NLC) sightings from 1885–1964 are presented in tabular form. The following conclusions were drawn from the presented data: (1) the peak of NLC activity in the Northern Hemisphere falls on July 10, 20 days after the summer solstice; (2) 78% of the displays occurred after the solstice; (3) the earliest and latest sightings were made on March 5 and Oct. 29, respectively; (4) there is no well defined periodicity in the number of sightings per year. J.L.D.

N65-28819# California Univ., Livermore. Lawrence Radiation Lab.
RADIOACTIVE PELLET TRAJECTORY STUDY. PROJECT SEDAN, NEVADA TEST SITE, 6 JULY 1962 Final Report
J. Allen 6 Jul. 1965 32 p refs
(PNE-218F) CFSTI: $2.00

An attempt was made to investigate the manner in which earth is ejected ballistically from a nuclear cratering experiment. Eighty-eight radioactive pellets (Co^{60}) were buried at known locations and depths prior to the event. After detonation a vehicle-mounted gamma scanner was used to survey the predicted angle of ejection and the northwest quadrant from ground zero. No preshot planted Co^{60} sources were recovered. Author

N65-28860# Union Carbide Nuclear Co., Paducah, Ky.
ENVIRONMENTAL MONITORING SUMMARY FOR THE PADUCAH PLANT FOR 1964
R. C. Baker and A. W. Russell 1 Jul. 1965 13 p refs
(Contract W-7405-ENG-26)
(KY-484) CFSTI: $1.00

Outdoor monitoring the air, water, and vegetation in the vicinity of the plant is summarized. The alpha activity measured on articulate samples collected at the north perimeter fence averaged 1.45 dpm/m^2 during the first six months and 0.74 dpm/m^2 during the second half of the year. The average beta activity decreased during the year and averaged much less than the activity of the previous two years. Gaseous fluoride concentrations at the sampling station nearest the fluorine manufacturing and utilizing facilities averaged 4.5 ppb during the period of feed plant operation and 0.8 ppb during the rest of the year. Gamma radiation levels were 0.02 ±0.01 mR/hr at all stations. Effluents from the gaseous diffusion plant operations were channeled and controlled as necessary for the environmental concentrations of chemicals and radioactivity in air, water, and vegetation to be at acceptably low levels during the year. E.E.B.

N65-28869*# Stanford Research Inst., Menlo Park, Calif.
MIDDLE LATITUDE CHANGES IN TOPSIDE ELECTRON DENSITY THROUGH A MAGNETIC STORM Technical Note No. 1, 24–28 Jun. 1963
Patricia L. Milic Jun 1964 21 p refs
(Contract NAS2-2112)
(NASA-CR-63869) CFSTI: HC $1.00/MF $0.50 CSCL 04A

Contours of electron density, as measured by the Alouette satellite, are drawn for the middle latitudes for three days in June 1963 during which a magnetic storm occurred. The changes in the patterns at local noon are discussed in terms of a two-dimensional curve fit of a separable function of height and latitude for 25° to 45° N. Author

N65-28873*# California Univ., Berkeley.
[SAPONIFIABLE AND NONSAPONIFIABLE SOXLET AND COLD SOLVENT EXTRACTS OF A NUMBER OF SOILS, RECENT SEDIMENT CORES FROM THE PACIFIC OCEAN, AND THE ORGUEIL CARBONACEOUS METEORITE] Semi-annual Progress Report, Nov. 1964–May 1965
Harold E. Urey and Bartholomew Nagy [1965] 5 p
(Grant NsG-541)
(NASA-CR-63875) CSCL 08G

N65-28946# Naval Research Lab., Washington, D. C. Inorganic and Nuclear Chemistry Branch.
POSTULATED ANOMALOUS DISSOLVED ATMOSPHERIC GAS CONCENTRATION IN THE ARCTIC OCEAN Interim Report
D. D. Williams and R. R. Miller 19 Apr. 1965 7 p refs
(NRL-6249; AD-615315) CFSTI: $0.50

The possibility of anomalous concentrations of dissolved atmospheric gas in certain Arctic Ocean waters is theorized. The unique geometry of the Arctic Basin and its permanent ice cover create a gigantic "zone-refiner" that could lead to this condition. The application of a previously developed NRL instrument to an investigation of this phenomenon is indicated and recommended. Author

N65-28980# Oak Ridge National Lab., Tenn.
ORBITS IN A MAGNETIC UNIVERSE
M. A. Melvin and J. S. Wallingford (Florida State Univ.) Jul. 1965 15 p refs
(Contract W-7405-ENG-26)
(ORNL-3827) CFSTI: $1.00

For a better understanding of the gravitational field of the static magnetic universe, the timelike and lightlike geodesics (i.e., the orbits in it of electromagnetically neutral test particles with unit or zero rest mass) were studied. The motion of test particles is like that in a Newtonian simple harmonic oscillator field since the density of magnetic flux, and energy and stress (gravitating mass) is approximately uniform in the vicinity of the axis. Constants of motion which correspond closely to z-component linear momentum, angular momentum, and energy in Newtonian mechanics are defined. Bounds are placed on these dynamical constants and on the apsidal radii by the requirement that the range of motion be real. The equations of motion are obtained via the Hamilton–Jacobi formalism which shows how invariances of the metric with respect to shifts in time, in the coordinate parallel to the symmetry axis, and in the azimuthal angle are responsible for the existence of a conserved energy, z-component linear momentum, and angular momentum, respectively. Results indicate that there is no escape from the gravitational attraction of the parallel bundle of magnetic field energy. Gravitational attraction falls off more slowly with distance than in the case of a spherically symmetric center of attraction and, in the case of the magnetic universe, a particle with a nonzero angular momentum is never able to escape on an asymptotically straight trajectory. W.M.R.

N65-28990# Utah Univ., Salt Lake City.
DIFFUSION OF THE GEOMAGNETIC FIELD THROUGH THE CORE AND MANTLE Engineering Experiment Station Bulletin No. 131
Keith L. Mc Donald 9 Dec. 1964 32 p refs *Its* Bull., Vol. 56, No. 20

The present work is preparatory to a computational analysis of the earth's deep interior. We wish to explore the remote interior regions by electrically shocking the (arrested) core fluid at assigned depths. The postulated exciting field is generated by an arbitrary surface distribution of toroidal electric currents of axial symmetry flowing in an infinitesimal shell. The observational field and total attenuation are then computed without approximation, aside from the usual ommision in hydromagnetism of the Maxwellian displacement current, account being taken of the known power law variation of electrical conductivity in the mantle. It is shown that for the class of fields employed here the overall transmission properties are not critically dependent upon the physical nature of the core-mantle interface. The rectilinear transmission through planar boundaries is also treated. Author

N65-29012# Los Alamos Scientific Lab., N. Mex.
ATMOSPHERIC OZONE TO 40 Km: ITS CONCENTRATION, DISTRIBUTION, METHODS OF DETECTION, AND RELATIONSHIP WITH OTHER METEOROLOGICAL PHENOMENA Bibliography
Betty S. Jackson 15 Jul. 1965 36 p
(Contract W-7405-ENG-36)
(LA-3328-MS) CFSTI: $2.00

N65-29019# Alaska Univ., College. Geophysical Inst.
BIBLIOGRAPHY OF PUBLICATIONS: SUPPLEMENT 1
Apr. 1965 11 p

N65-29023# Naval Weapons Lab., Dahlgren, Va.
BALLISTIC CORRELATION ALTITUDES FOR RE-ENTRY WINDS AND NONSTANDARD AIR DENSITIES
Doreen H. Daniels Apr. 1965 37 p refs
(K-49/65; AD-614710)

This memorandum gives the results of a limited analysis of typical rawinsonde data made to determine if there is an altitude or pressure level at which the density and wind correlate with total ballistic densities and winds. This analysis was made for two theoretical ballistic missiles, having typical reentry shapes, and employed 100 individual rawinsondes, representing all months of the year, obtained at stations representing wide geographic distribution. Author

N65-29037# Joint Publications Research Service, Washington, D. C.
STUDIES IN DETERMINATION OF ATMOSPHERIC TEMPERATURE PROFILE, OUTGOING RADIATION FIELDS, PARTICLE CONCENTRATION, AND ATMOSPHERIC DENSITY
22 Jul. 1965 58 p refs Transl. into ENGLISH from Kosmich. Issled. (Moscow), no. 3, 1965
(JPRS-31-208; TT-65-31705) CFSTI: $3.00

The results of a statistical analysis, comparison, and interpretation of the structural characteristics of outgoing radiation fields based on data from the meteorological satellites Tiros II and Tiros III are presented. A method for determining the vertical atmospheric temperature profile from outgoing radiation measurements in the CO_2 absorption band

and the results of a manometer determination of the atmospheric density and particle concentration at heights of 120 to 360 kilometers are also presented. R.N.A.

N65-29038# Joint Publications Research Service, Washington, D. C.
THEORY OF MEASURING GRAVITY FROM AN AIRPLANE USING THREE STRING TRANSDUCERS WITH ORTHOGONAL AXES OF SENSITIVITY
Yu. A. Tarakanov 23 Jul. 1965 18 p refs Transl. into ENGLISH from Fiz. Zemli (Moscow), no. 5, 1965 p 33–41
(JPRS-31220; TT-65-31717) CFSTI: $1.00

The possibility of measuring the force of gravity from an aircraft with the aid of three string transducers with orthogonal axes of sensitivity is investigated. The absolute motion of a system of three orthogonal transducers connected by a rigid base is analyzed. An exact formula is derived for computing the current values of the acceleration of gravity without imposing restrictions on the magnitudes and the structure of accelerations and inclinations, but which contains all corrections for dynamic perturbations. R.N.A.

N65-29068# Technical Operations Research, Burlington, Mass.
RESEARCH ON CIRCULATION IN NUCLEAR CLOUDS, II Final Report
H. G. Norment 1 Nov. 1964 13 p refs
(Contract OCD-OS-62-186)
(TO-B-64-102A)

A study of close-in fallout hazard from surface bursts of nuclear weapons was undertaken. Cinefilms of nuclear test shots were evaluated, and a theoretical circulation model based on an application of classical fluid dynamic analyses to circulatory flow in nuclear clouds was developed. It was found that the circular ring vortex has the greatest capability to simulate dynamic nuclear clouds. Particle dynamics analyses were performed to develop procedures for calculating trajectories of particles moving under the influences of forces in action within a dynamic nuclear cloud. Fluid drag, local turbulence, pressure gradients, and gravity were considered. A program for computer simulation of particle motion in nuclear clouds was coded, debugged, and operated on the IBM 7094 computer. Trajectories for particles up to 1000 μ diameter were calculated for a cloud model. W.M.R.

N65-29077# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MARINE GRAVIMETRIC OPERATIONS
D. L. Tereshko, R. M. Gadzhiyev, and I. S. Gasanov 20 May 1965 15 p Transl. into ENGLISH from Geofiz. Izuch. Geol. Stroyeniya Neftegazonosnykh Obl. Azerb. (USSR), 1963 p 58–64
(FTD-TT-65-426/1; AD-466199)

A review of marine gravimetric operations for charting gravitational force over the Caspian Sea and coastal areas is presented. A summary is given of experiments using pendulum instruments and bottom gravimeters from 1929 to 1960. L.S.

N65-29094# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDYING SHOCK WAVE PROPAGATION IN THE SOIL
N. Zhubayev 7 May 1965 15 p refs Transl. into ENGLISH from Vestn. Akad. Nauk SSSR (Moscow), no. 3, 1964 p 47–56
(FTD-TT-64-1387/1+2; AD-615867)

Shock wave propagation in a homogeneous continuous medium, such as soil and rocks occupying the lower semi-space, is discussed. General equations were derived for the longitudinal–transverse movement behind a compression–displacement wave in this medium. An approximation method is given for the integration of these equations in the case of small displacement deformation, in comparison with longitudinal deformation. Wave equations for a constant load on the boundary are derived. Velocity, acceleration, deformation, stress, and wave equations are also derived for the case of a monotonously decreasing load on the boundary. Methods of determining functions of state of the medium where the volumetric stress is dependent on the volumetric deformation are given. C.T.C.

N65-29095# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ASPHERICITY OF THE EARTH AND ITS EFFECT ON THE MOVEMENT OF A SATELLITE
L. D. Nikolenko 7 May 1965 7 p ref Transl. into ENGLISH from Dopovidi Akad. Nauk Ukr. RSR., (Kiev), no. 6, 1964 p 745–748
(FTD-TT-65-11/1; AD-615874)

The results are presented of analytical investigation of the motion of an artifical satellite in a non-central field of gravity of the earth. An approximate solution of the problem is obtained by the averaging method of N. M. Krylov and N. N. Bogolyubov. Author

N65-29106# Massachusetts Inst. of Tech., Cambridge.
MAGNETIC TAPE COPIES OF MIT GEOPHYSICS PROGRAM SET II (TIME SERIES PROGRAMS FOR THE IBM 709, 7090, 7094) Scientific Report No. 10
S. M. Simpson, Jr. 31 Mar. 1965 84 p
(Contract AF 19(604)-7378; ARPA Order 180-61; Proj. Vela-Uniform)
(AFCRL-65-306; AD-616254)

MIT Geophysics Program Set II consists of 267 subroutines, written in FORTRAN or in FAP compatible with FORTRAN-II, for the IBM 709, 7090, 7094. They form an interlocking system of individually accessible routines for single and multiple time series analysis (correlation, spectral analysis, prediction, filtering, spectral and correlation factorization, polynomial operations, probability operations) but also include many general utility and administration routines. Comment cards in each symbolic deck give full documentation. Complete copies of the symbolic system are available and require two 800 BPI tapes. Author

14 INSTRUMENTATION AND PHOTOGRAPHY

Includes design, installation, and testing of instrumentation systems; gyroscopes; measuring instruments and gages; recorders; transducers; aerial photography; and telescopes and cameras.

N65-28022# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
AERIAL AND GROUND GAMMA SURVEY MONITORS
L. D. Philipp and E. M. Sheen May 1965 17 p refs
(Contract AT(45-1)-1830)
(BNWL-62) CFSTI: $1.00

Two sensitive reliable gamma monitors were developed for aerial and ground level environmental radiations surveys. The aerial monitor was used in an airplane and operated 500

ft above the ground at 140 mph and the ground monitor in a ground vehicle operated over difficult terrain. The aerial monitor employs a 5-in. diameter by 3-in. long NaI(T) crystal, detector with the multiplier phototube capacity coupled to a solid state preamplifier. The monitor can detect 0.1 μCi of Ba^{131} at 14 in. from the center of the detector and can detect a general ground contamination of 0.4 μCi per square meter of I^{131} from 500 ft above the ground if the I^{131} extends over an area approximately 2000 ft in diameter. The ground monitor uses a 5-in. diameter by 5-in. long plastic scintillator. The minimum detection level for the ground monitor was 0.1 μCi of Ba^{131} at a distance of 13 in. from the center of the detector. Both monitors meet specific requirements and feature scintillation detectors, solid state circuitry, portability, rugged construction, and the capability for recording data. R.N.A.

N65-28024*# National Aeronautics and Space Administration, Washington, D. C.
PEGASUS C WITH DETACHABLE PANELS News Release
Milton B. Ames, Jr., John H. Disher, and Joe Stein 8 Jul. 1965 15 p Press Conference Available from the Scientific and Technical Information Division CSCL 11F

A news conference reporting plans to attach some interchangeable or removable material, test samples, on the Pegasus C spacecraft is presented. The experiments constitute attaching 48 coupons to the capacitor detector panels in two local areas on the wing of the Pegasus spacecraft to obtain from the space materials that have been exposed to the space environment for long periods of time, the effects of the space environment for correlation with ground-base studies to help improve efforts to simulate the space conditions on the ground in future space vehicle design. Basic details of the experiment are given. Questions and comments concerning the experiments are entertained from the conference participants. N.E.A.

N65-28083# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TRANSACTIONS OF CENTRAL SCIENTIFIC AND RESEARCH INSTITUTE OF GEODESY, AERIAL PHOTOGRAPHY AND CARTOGRAPHY Selected Articles
24 Feb. 1965 44 p refs Transl. into ENGLISH from Tr. Tsentral. Nauchno-Issledovatel. Inst. Geodezii, Aeros'yemki i Kartografii (Moscow), no. 146, 1962 p 17-26, 93-103, 121-132 (FTD-MT-64-263; AD-612770)

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N65-28084 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
IMPROVED MODEL OF RVTD RADIO ALTIMETER
I. L. Gill *In its* Trans. of Central Sci. and Res. Inst. of Geodesy, Aerial Phot. and Cartography 24 Feb. 1965 p 1-8 (See N65-28083 17-14)

The RVTD radio altimeter was modernized to obtain reliable readings of radio altimeter in mountain region aerial surveys. The previously used or present RVTD radio altimeters operate unsatisfactorily in mountain regions because of insufficient power of the ultrahigh frequency generator transmitter. The modernized model of RVTD radio altimeter differs from the present models in that the power of the ultra high frequency generator is increased 4.5 to 5 times. This modernization is applied to the transmitter. Only insignificant changes were introduced in the circuits of the receiver. A detailed description is given on the modernization changes introduced in the circuitry of the transmitter of the modernized model. N.E.A.

N65-28085 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACCURACY OF DETERMINATION OF HEIGHTS OF PHOTOGRAPHING BY READINGS OF RADIO ALTIMETER RVTD AND ITS MODERNIZED MODEL
N. P. Kozhevnikov and Yu. I. Smirnov *In its* Trans. of Central Sci. and Res. Inst. of Geodesy, Aerial Phot., and Cartography 24 Feb. 1965 p 9-13 (See N65-28083 17-14)

Research on accuracy of determination of heights of photographing were conducted according to materials of aerial photograph of various years and regions. Appraisal of accuracy was executed with respect to results of convergence of differences of heights of photographing, obtained by readings of radio altimeter and from photogrammetric measurements, on the basis of a known formula. It is shown that average quadratic accidental error of determination of heights of photographing according to readings of radio altimeter RVTD and modernized RVTD is within limits of ± 1.0 to ± 1.5 m for open level and hilly regions and in mountain regions with difference of heights up to 500 m. These data satisfy requirements of photogrammetric treatment of surveys in a scale of 1:25,000, including condensing of the heights on the basis of aeroradioleveling. N.E.A.

N65-28086 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SCALING DEVICES IN STEREOPHOTOGRAMMETRIC INSTRUMENTS OF A CONVERTED SHEAF
F. V. Drobyshev *In its* Trans. of Central Sci. and Res. Inst. of Geodesy, Aerial Phot., and Cartography 24 Feb. 1965 p 14-24 refs (See N65-28083 17-14)

This article discusses scaling devices developed for stereograph SD. Devices discussed include: (1) pantograph; (2) smooth coordinatograph; (3) affine coordinatograph; and (4) a coordinatograph built on the principle of a mechanical height meter. N.E.A.

N65-28087 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ESTIMATION OF ACCURACY OF STRATOSCOPE READINGS
M. D. Konshin *In its* Trans. of Central Sci. and Res. Inst. of Geodesy, Aerial Phot., and Cartography 24 Feb. 1965 p 25-27 (See N65-28083 17-14)

Existing methods of estimation of accuracy of statoscope readings are based on double determination of longitudinal angles of slope of air-photo with respect to elements of mutual

orientation and with respect to angles of inclination of preceding and subsequent bases. These methods have been found unsatisfactory because systematic errors are excluded from the readings. This article presents two methods for the determination of mean square errors in statoscope readings in which errors of mutual orientation both random and systematic can be computed. N.E.A.

N65-28088 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EXPERIMENTAL WORK ON HIGH-ALTITUDE PHOTOGRAMMETRIC CONDENSING AND USE OF POINTS OF PHOTOGRAMMETRIC CONDENSING DURING WORK ON STD
N. A. Sokolova and S. Mil'ner *In its* Trans. of Central Sci. and Res. Inst. of Geodesy, Aerial Phot., and Cartography 24 Feb. 1965 p 28–41 (See N65-28083 17-14)

Experimental work on photogrammetric condensing of heights to eliminate insufficient accuracy obtained in construction of networks of space phototriangulation. It is shown that the use of constructed programmetric points makes it possible to increase both accuracy of photogrammetric condensing of high-altitude support networks and also accuracy of orientation of air-photos on STD. In brief photogrammetric networks, constructed according to air-photos of scales of 1:12,500 to 1:2600, accumulation of errors is so insignificant that accuracy of determination of heights in average and initial stereopairs is obtained practically identical. During determination of heights of points of photogrammetric condensing from two adjacent routes, their accuracy is increased by 1.2 to 1.25 times, and is not proportional to $\sqrt{2}$, as was assumed during theoretical calculations. With a set of pickets on a topographic stereometer according to air-photos oriented with respect to four constructed photogrammetric points determined from brief photogrammetric networks, accuracy of heights is obtained almost the same as during orientation with respect to geodesic points. N.E.A.

N65-28091* Texas A&M Univ., College Station. Activation Analysis Research Lab.
DETECTOR RESEARCH
Carroll F. Lam *In its* An Invest. of Computer-Coupled, Autom., Remote Activation Analysis for Lunar Surface Analysis 1 May 1965 12 p refs (See N65-28089 17-06) CFSTI: HC $3.00/MF $0.75

To optimize a discriminator, a variation was made in the pulse shape discrimination circuitry used with a dual-crystal scintillation detector for Compton reduction. The dual crystal detector system is schematically drawn, and a circuit diagram of the discriminator is shown. The detector in conjunction with the discriminatory circuit is capable of reducing the area of the Compton background by a factor of two which appears to be the limits of reduction with the circuit used. Passing pulses from a photomultiplier through a double delay line amplifier is another possible method of pulse shape discrimination considered. A typical set of double delay line amplifier output pulses from equal energy NaI and CsI interactions is graphed. L.S.

N65-28105# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TENSOTHERMAL SENSING ELEMENT TO MEASURE STATIC DEFORMATIONS UNDER CONDITIONS OF VARIABLE TEMPERATURES
V. F. Lukashik and O. Z. Galkina 15 Jan. 1965 5 p Transl. into ENGLISH from Soviet Patent No. 158718 (Appl. No. 804643/25-8, 24 Nov. 1962) p 1–2
(FTD-TT-64-724/1+2; AD-610389)

Tensothermo sensing elements for the measurement of static deformation under conditions of variable temperature are discussed. The outstanding feature of these elements is that the sensitive thermo- and tensoelements are situated on one base, electrically isolated from each other, and are connected into individual channels to the measuring apparatus. Schematics of various arrangements of thermo- and tensoelements in a tensothermo-sensing element are shown. E.E.B.

N65-28124# Honeywell, Inc., Minneapolis, Minn. Systems and Research Div.
AEROSPACE PHOTOGRAPHIC RECONNAISSANCE EXPERIMENTS (NATURAL ATMOSPHERIC TURBULENCE) Interim Engineering Report No. 10, 1 Feb.–31 May 1965
R. D. Ewing and P. D. Mitchell 25 Jun. 1965 71 p refs
(Contract AF 33(657)-7171)
(Rept.-2735-IR10; AD-465540)

Three successful aerospace photographic reconnaissance experiments (APRE) were conducted. In each experiment, a 1.63-million-cubic-foot mylar scrim balloon was used to lift the APRE gondola to an altitude of approximately 80 000 feet. Two B57-B aircraft with special photographic targets painted on their top surfaces flew in formation under the gondola at various altitudes. A fleet of mobile photographic ground targets were positioned across the expected balloon flight path. A new LG77B1 camera and a new gondola were used to photograph the targets. Minimum damage was sustained on each impact. R.N.A.

N65-28139 Baldwin-Lima-Hamilton Corp., Waltham, Mass. Electronics Div.
SEMICONDUCTOR STRAIN GAGE HANDBOOK. SECTION II: DATA REDUCTION
James Dorsey 1 Aug. 1964 17 p refs

A simple corrective method and an accurate table method of data reduction are described for the practical application of positive gage factor P-doped silicon strain gages. The corrective method can be used when the strain gage applications involve small strain differences and the cost of data reduction is irrelevant. When errors encountered are too large to be tolerated, the table method can be used. Examples of data reduction techniques are presented and are the same for both methods so that results and accuracies can be compared. A temperature-coefficient curve for an unstressed filament and a set of strain sensitivity tables are included. R.N.A.

N65-28151# Parametrics, Inc., Waltham, Mass.
IONIZING RADIATION TECHNIQUES FOR MEASURING FREE STREAM AIR DENSITY ABOARD RE-ENTRY VEHICLES Technical Report, Mar. 1964–Feb. 1965
Bach Sellers and John Papadopoulos Wright-Patterson AFB, Ohio, AF Flight Dyn. Lab., Mar. 1965 100 p refs
(Contract AF 33(615)-1288)
(AFFDL-TR-65-40; AD-465770)

An investigation to determine the feasibility of measuring air density by radiation techniques from ground to 600 kilofeet, aboard a reentry vehicle, has been successfully carried out. Both radioisotope and electrical techniques of producing the probing ionizing radiation were considered. By both theory and experiment it was demonstrated that an instrument incorporating the following two techniques can perform the task of density measurement satisfactorily: (1) X-ray scatter to measure shock

layer density between 0 and 100 kilofeet. (2) Bremsstrahlung X-rays produced by an electron beam for measuring ambient density between 300 and 600 kilofeet. This approach appears promising as a means of density detection near the vehicle surface and, also, for providing a more stable source of ionizing radiations over prolonged periods of time. Author

N65-28152# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INFRARED TECHNOLOGY IN MILITARY MATTERS
Yu. A. Ivanov and B. V. Tyapkin 12 Jan. 1965 335 p refs Transl. into ENGLISH of the book "Infrakrasnaya Tekhnika v Voyennom Dele" Moscow, Izd. Sovetskoe Radio, 1963 p 1–359
(FTD-MT-64-153; AD-610765)

In this book physical phenomena connected with radiation propagation and registration of infrared rays are considered; it presents generalized material of works in the region of military application of infrared rays and makes an attempt at analysis of the promising developments in this region of military technology. The book consists of two parts. In the first part, including six chapters, are considered questions of physics and technology of radiation, propagation, and registration of infrared rays, and also certain elements of military instruments founded on the use of infrared rays. In the second part, including six chapters, an analysis is made of the development and contemporary state of instruments of infrared technology applied by foreign armies. In the second part the greatest attention is given to questions of intelligence, detection, and aiming with the help of instruments of infrared technology, which is not sufficiently illuminated in domestic literature. All concrete examples, concerning constructive solutions, technical and tactical appraisals and characteristics, and also prospects of development, given in this book are based on material of foreign technical literature.
N.E.A.

N65-28153# Astro-Space Labs., Inc., Huntsville, Ala.
STUDY AND PROTOTYPE MODEL DESIGN OF A MINIATURIZED GYROCOMPASS Final Engineering Report, 18 Jun. 1964–15 May 1965
R. G. Mapes 30 May 1965 94 p refs
(Contract DA-44-009-AMC-673(X))
(ASL-FE-65-21; AD-465330)

This report presents the studies and investigations performed to determine the feasibility of and the techniques and instrumentation necessary for employing gyroscopic principles in a small, rugged instrument which can be used by observational troops to determine azimuth to visible landmarks. The design, fabrication and test of a laboratory model vortex-centered spinning-sphere gyro was conducted, along with a theoretical investigation of the hydrodynamic equations of motion. A miniature, gas bearing suspended spinning-sphere gyro design was formulated which yielded an ideal solution for north-seeking application. This basic inertial sensor was integrated with the various other subsystems to yield an overall design configuration which offers a very attractive mechanization technique for this application. Author

N65-28166# Naval Research Lab., Washington, D. C. Applications Research Div.
AN EXPERIMENTAL EVALUATION OF FOUR TYPES OF ALTIMETERS USING BOTH PILOT AND ENLISTED MEN SUBJECTS Interim Report
R. Chernikoff and P. N. Ziegler 18 Dec. 1964 13 p
(NRL-6232; AD-610665)

Eighteen pilots and seven Navy enlisted men participated in an evaluation of four altimeters: counter-pointer (CP), counter-drum-pointer (CDP), drum-pointer (DP), and three-pointer (3P). The experimental situation required the subjects to track a dot on a crt while reading altimeter settings suddenly presented by the opening of a shutter. Subjects operated a hand switch to close the shutter after reading the altitude presented. Measures were taken of the length of the exposure time and the accuracy of the reported altitude. The results indicated that for both pilots and enlisted men the CP and CDP altimeters yielded nearly identical exposure times, with the DP and 3P showing progressively longer times. Both groups made considerably more errors in reading the 3P than any of the other altimeters. On the basis of all the data obtained, the rankings of the altimeters, from best to worst, are: CP, CDP, DP, and 3P, with the difference between CP and CDP considered to be very slight. Author

N65-28192# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SYMPOSIUM ON THE STRUCTURAL PROPERTIES OF PHOTOGRAPHIC LAYERS AND THEIR INFORMATION CAPABILITY
I. I. Breydo 7 Apr. 1965 9 p Transl. into ENGLISH from Zh. Nauch. i Priklad. Fot. i Kinematografii (Moscow), v. 9, no. 2, 1964 p 155–156
(FTD-TT-65-294/1; AD-614768)

The importance of an over-all evaluation of the structural properties of photographic materials which determine the quality of the photographic image is stressed. It is stated that measurement of the resolving capability alone is not sufficient for this purpose; it is necessary to consider other methods of evaluating structural properties and of comparing them. The sensitivity of a photographic material must not be considered separately from its ability to reproduce small image elements or from its information capability. TAB

N65-28196# Picatinny Arsenal, Dover, N. J.
A 200-SECOND MAGNETIC CORE TIMER
Douglas L. Dickerson Feb. 1965 28 p
(PA-TR-3225; AD-614564)

The application of magnetic cores as major components in a settable timer for missile environment was investigated and prototype models developed. The timer consists of a temperature-stabilized 1000-cycle L-C oscillator accurate to 0.1%, a magnetic-core counter in double line shift register mode, and a remote selection unit. Time delays from 1 to 200 seconds can be obtained with a setting resolution to 0.1 second. Maximum error is 0.1% of the time selected over an operating temperature range from −65° F to +165° F. Size of the timer package is projected to be less than 10 cubic inches while power consumption is less than 40 milliwatts with a power source of 5.6 volts ±10%. The count state of the system is defined by the direction of remanent magnetism in the magnetic cores and, therefore, is not altered by the loss or absence of power-supply voltage. Sufficient energy will remain in the capacitors to complete any data transfer already under way at the time of failure. The remote selection system eliminates the need for circuit power while the time delay is being selected. The time delay selected can be stored without standby power for an indefinite length of time because of magnetic storage. Author

N65-28207# Giannini Controls Corp., Duarte, Calif.
BRUSHLESS PRECISION POTENTIOMETER Interim Development Report, 20 Jul.–5 Nov. 1964

3 Feb. 1965 24 p refs
(Contract NObsr-91175)
(ER-8645-2; AD-610718)

Herein described are two techniques for the deposition of photosensitive layers. One of these is a technique for sensitizing evaporated layers of CdS or CdSe and the other a technique for depositing a reasonable reproducible layer of photo-sensitive material for sintering. Also included are preliminary results of tests to determine a correlation photoconductivity and gap geometry. Some measurements have been made on the linearity of a resistive strip equal to circumference of a brushless potentiometer. Photoconductivity as a function of sintering time and temperature was studied and showed that there is no apparent correlation. However, photoconductors on Al_2O_3 are statistically more sensitive than those on glass. Author

N65-28238# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INCREASE IN THE SENSITIVITY OF PHOTOGRAPHIC MATERIALS WITH THE AID OF SUPPLEMENTARY LIGHT INTENSIFICATION IN THE PHOTOGRAPHING OF ARTIFICIAL SATELLITES OF THE EARTH

I. I. Breydo, A. A. Markelova, and B. A. Firago 16 Apr. 1965 21 p refs Transl. into ENGLISH from Izv. Glavnoi Astron. Observ. (Puckovo), v. 23, No. 2, 1963 p 167–174
(FTD-TT-64-1156/1+2; AD-615222)

It was found that uniform intensity gating of photographic negatives by weak diffused light for 3 to 5 minutes leads to a noticeable increase in the photographic effect, if the exposure was of the order of 0.05-0.01 sec. The effectiveness of the latensification of the image by intensity gating is great in those cases where the photographic materials are developed not to the maximum contrast. However, in the case of observation of artificial satellites of the earth, where the photographic materials were developed almost to maximum contrast, the gain in sensitivity amounts to about 60–80%. The corresponding increase in the limiting stellar magnitude of the observed stellite by magnitudes of 0.5–0.6, has great significance in many cases, since the intensity of the background produced by intensity gating should not go above 0.1, and the coefficient of contrast is hardly reduced. Author

N65-28259 Joint Publications Research Service, Washington, D. C.

A LIQUID FLOWMETER OPERATING ON THE PRINCIPLE OF NUCLEAR MAGNETIC RESONANCE

A. I. Zhernovoy and V. M. Stasevich *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 62–66 refs (See N65-28250 17-10) CFSTI: $5.00

Described is a noncontact flowmeter for measuring flows of liquid proton-containing dielectrics flowing at rates ranging from 0.5 to 4 m^3/hr. The instrument is based on a method for magnetic registration which considers the phenomenon of nuclear magnetic resonance. The basic design consists of three units: a transducer installed directly for measuring the rate of flow, a nuclear resonance signal detector which is connected to the transducer by a cable, and a measuring unit which contains the remaining radio circuitry and the power supply. Experimental results showed that errors in measurement did not exceed one per cent. S.C.W.

N65-28264 Joint Publications Research Service, Washington, D. C.

ON THE PROBLEM OF CONSTRUCTING HIGH RESOLUTION TWO-SCALE ANGLE-CODE TRANSDUCERS

O. M. Saltykovskiy *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 99–104 refs (See N65-28250 17-10) CFSTI: $5.00

Inherent problems associated with the construction of two-scale, high-precision transducers using pick-ups with electrical reduction, are discussed. Described are requirements for stabilizing the electric circuits and the precision of the course pick-up, and possible compensation circuits for the instabilities which arise. S.C.W.

N65-28266 Joint Publications Research Service, Washington, D. C.

GYROSCOPIC AND NAVIGATIONAL INSTRUMENTS. STABILITY AND NATURAL OSCILLATION OF UNEQUALLY RIGID GYROSCOPIC SYSTEMS WITH EXTERNAL INFLUENCE

S. A. Chernikov *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 112–119 refs (See N65-28250 17-10) CFSTI: $5.00

The effect of unequal rigidity of elements of the universal joint [kardan], suspension, and reductor of the actuating motor on the stability and quality of movement of gyroscope systems is considered. Using Ye. P. Popov's method of harmonic linearization, conditions for the arising of natural oscillations and the dependence of their parameters on the amount and sign of the external actuating influence are obtained. On the plane of the parameters of the gyroscopic system, regions of stability, natural oscillation, and instability are distinguished. Formulas for determining the reaction of non-linear gyro systems on external constant and slowly changing disturbances are presented. Author

N65-28267 Joint Publications Research Service, Washington, D. C.

ERRORS OF THE GYROSCOPIC INTEGRATOR OF LINEAR ACCELERATIONS

L. I. Kargu *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 120–125 refs (See N65-28250 17-10) CFSTI: $5.00

From results of the solution of non-linear differential equations, the article investigates the movement of a statistically unbalanced three-stage gyroscope. The method of successive approximations is used to find the expression determining the error in speed of precess of the outer frame, which is caused by the inertia of the gyroscope suspension. Author

N65-28268 Joint Publications Research Service, Washington, D. C.

COMPARATIVE EVALUATION OF COMPENSATING-TYPE INTEGRATING ACCELEROMETERS

L. V. Polonskaya *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 126–133 refs (See N65-28250 17-10) CFSTI: $5.00

On the basis of an examination of typical systems, the analytical relations which connect the parameters of the instrument with the error of integration are obtained in general form. An evaluation of the error of integration is conducted from the amount of the least allowable frequency of integration of the harmonic input signal and the greatest allowable time for integrating a step signal. Author

N65-28270 Joint Publications Research Service, Washington, D. C.

PRECISION MECHANICS INSTRUMENTS. THE UPPER LIMIT OF ERROR OR DISCREET MEASUREMENT OF VELOCITIES AND ACCELERATIONS

V. A. Levidov and O. N. Tikhonov *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 140–144 refs (See N65-28250 17-10) CFSTI: $5.00

Described is a method for estimating the upper limit of error in discrete measurements of velocities and accelerations, and

values proportional to the derivatives of higher orders of input signals. It is shown that by mutually considering the principles affecting the upper limit of error, as discrete time and discrete level, estimates of the optimum interval of discreetness can be found in which the upper limit will be least. S.C.W.

N65-28273 Joint Publications Research Service, Washington, D. C.
OPTICAL INSTRUMENTS. PHASE PHOTOELECTRIC MICROSCOPES
M. G. Mikhaylova *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 155–161 refs (See N65-28250 17-10) CFSTI: $5.00

A comparative analysis of two phase photoelectric microscopes of different construction is reported. Examined were a phase microscope in which scanning was accomplished using a vibrator (back-and-forth motion); and a phase microscope in which scanning was accomplished using a rotating many-sided prism (one-directional movement while the sweep is sinusoidal). The phase microscope with the rotating prism was found to have greater accuracy in view of its high sensitivity and greater sweep. S.C.W.

N65-28335# Illinois Univ., Urbana.
THE UNIVERSITY OF ILLINOIS RADIO TELESCOPE Progress Report, 1 Oct.–31 Dec. 1964
G. C. Mc Vittie and G. W. Swenson, Jr. 28 Jan. 1965 6 p
(Contract Nonr-1834(22))
(PR-22; AD-610619)

Progress related to general maintenance, electronics, and observations is reported for the radio telescope. The towers were returned to their original vertical position in order to assure symmetry, and improvements were made in the actuating machinery of the elevator. Calibration has been completed of antenna parameters, including system sensitivity, beamwidths, and pointing accuracies, as a function of beam declination over the 60° region of sky visible with the radio telescope. The digitizing system has reached its final form, and a flow diagram for data reduction by digital computer has been completed. The radiometer operated satisfactorily, with down time consisting of only about 10% of total observing time. Forty-five scans, three per declination setting, have been made in the 40° region, and a map of the Cygnus Y region has been prepared. Quasi-stellar sources are being observed to check for variability. M.W.R.

N65-28342# Ford Instrument Co., Long Island City, N. Y.
FEASIBILITY STUDY FOR A POSITION LOCATOR Final Report
Dec. 1964 36 p refs
(Contract DA-18-001-AMC-286(X))
(AD-610546)

Two breadboard models of a self contained man position locator were fabricated and tested to demonstrate their feasibility. The position locator consists of a pedometer step sensor, an accelerometer for measuring a step parameter which provides for variations in pace length, a computer to receive the signals and covert them into map coordinates, and two counter type indicators for each map coordinate to indicate position. The locator models demonstrated that a man's position can be measured to accuracies of 2% and better under many different types of terrain and ground surface. R.N.A.

N65-28343# Naval Research Lab., Washington, D. C.
ALTIMETER DISPLAY EVALUATION Final Report
J. H. Hill and R. Chernikoff 26 Jan. 1965 11 p refs
(NRL-6242; AD-610664)

A series of investigations has recently been completed to determine the relative effectiveness of various altimeter displays. These investigations were concerned with the replacement of current altimeters in most military aircraft with a servo-pneumatic type instrument. The counter-pointer (CP), counter-drum-pointer (CDP), drum-pointer (DP), and three-pointer (3P), were compared in a series of laboratory experiments measuring reading time and accuracy with both pilots and nonflying enlisted men. The results of the various phases of laboratory research showed that CP and CDP altimeter presentations ranked highest, followed by the DP, with the 3P consistently lowest. Pilot preference in the flight tests was overwhelmingly in favor of the CDP. Author

N65-28370*# Battelle Memorial Inst., Columbus, Ohio.
CONTINUATION OF THE SMALL-SCALE OPERATION OF A TRANSDUCER INFORMATION CENTER Final Technical Report, Mar. 1964–Apr. 1965
W. E. Chapin, G. L. Mc Cann, and W. H. Veazie Wright-Patterson AFB, Ohio, AF Flight Dyn. Lab., 15 Apr. 1965 45 p
(Contracts AF 33(615)-1819; AF 33(657)-11083)
(AFFDL-TR-65-30; AD-614816) CSCL 14B

This final report summarizes work performed in determining implementation techniques and studies of the feasibility for their application in the operation of a small-scale transducer information center (TIC). Work on the TIC during this year has consisted of (1) expanding phases of information screening and acquisition, (2) visiting and conferring with manufacturers and users of transducers, (3) preparing and publishing quarterly accessions lists, (4) collecting and publishing a compilation of transducer research contracts and programs, (5) answering requests for information, (6) preparing a state-of-the-art report on digital transducers, (7) providing representation at conferences, symposia, and workships, (8) publishing a technical paper on transducers, and (9) producing a brochure that describes the TIC functions and objectives. N.E.A.

N65-28373# India. Dept. of Atomic Energy, Bombay. Nuclear Physics Div.
CONTROL CIRCUITS FOR AUTOMATIC OPERATION OF NEUTRON SPECTROMETERS
P. K. Iyengar and P. R. Vijayaraghavan 1964 38 p
(AEET-NP-12)

The circuits developed for the automatic operation of crystal spectrometers are described. A thin BF_3 counter placed in the exit of the monochromatic beam is used to monitor the flux and the pulses obtained are amplified and scaled down by suitable scalers and then fed to the count coil of a preset counter. The control system takes the signal counts for a fixed number of counts and then takes an immediate measure of the background by introducing cadmium into the monochromatic beam. This is followed by a movement of the scattering angle through a suitable increment and the readings are repeated. Since a reactor operates continuously, such a method takes full advantage of the continuously available neutron flux. E.E.B.

N65-28411 Centre de Recherches Nucleaires, Strasbourg (France). Dept. de Physique Corpusculaire.
SEMI-AUTOMATIC DEVICE TO MEASURE THE WIDTH OF TRACKS: SEMI-AUTOMATION IN CORPUSCULAR PHOTOGRAPHY [DISPOSITIF SEMI-AUTOMATIQUE DE MESURE DE LARGEUR DE TRACES—SEMI-AUTOMATION EN PROTOGRAPHIE CORPUSCULAIRE]
H. Annoni, G. Baumann, H. Braun, E. Christophel, and P. Volmer *In its* Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 14 p refs In FRENCH (See N65-28375 17-24)

A microscope and oscilloscope assembly for measurement of the width of nuclear particle traces in emulsion layers is described. The image of the trace, which appears dark against a light background, is projected by the beam from a lamp through a slit in a screen, and enters a photomultiplier which detects the intensity of the luminous flux as it passes in successive phases through the slit. The output signal from the photomultiplier is fed into an oscilloscope where the variation in intensity of the flux can be observed. A semi-automated microscope-computer device for measuring diffusion potentials is described briefly. Trans. by J.M.D.

N65-28413 Johann-Wolfgang-Goethe-Universität, Frankfurt am Main (West Germany). Institut für Kernphysik.
A SEMI-AUTOMATIC DEVICE FOR ANALYZING TRACKS IN NUCLEAR EMULSIONS
K. Breuer and E. Rössle *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 8 p refs (See N65-28375 17-24)

A description of a semi-automatic photo-optical device that measures length, ionization, and geometrical orientation of ionized particle tracks in nuclear emulsions is given. The track to be measured is steered by an operator along a fixed marking in the field of view. The driving along the three directions of motion of the microscope stage is accomplished by pulse driven motors, which are controlled by linear frequency generators such that the resulting speed along the track is constant. The length of the track is determined by the time spent steering the track along the marking. The components of the length of the stage axis are also measured, yielding the spatial orientation of the track. The specific ionization is measured by photoelectrically counting the grain. Schematic drawings of the device systems, and a photograph of the device is included. L.S.

N65-28414 Max-Planck-Institut für Physik und Astrophysik, Munich (West Germany).
A MECHANICAL ANALOG COMPUTER FOR RANGE AND ANGLE MEASUREMENTS IN NUCLEAR EMULSIONS
W. Hitzeroth *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 6 p (See N65-28375 17-24)

In the following we described the main features of a mechanical analog computer, linked to a Koristka R-4 microscope, which is very useful for routine measurements of ranges and space angles, as they occur for instance, in connection with experiments using nuclear emulsions inside gas targets. Author

N65-28415 London Univ. (England).
AUTOMATIC FOLLOWING IN NUCLEAR EMULSIONS
M. J. Duff *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 3 p (See N65-28375 17-24)

An automatic following microscope with a comprehensive logical control circuit, useful for measuring ionized particle tracks in nuclear emulsions, is described. The technique operates on the three dimensional projected image of the nuclear emulsion and produces servo signals enabling the microscope to follow particle tracks through single emulsion sheets. The microscope can read out X, Y, and Z co-ordinates of points along tracks being followed. The dip angle of the track, and the projected angle in the X Y plane are measured by the following servos and can easily be digitized if required. Similarly the average optical density of the track is measured and can be read out. The system is ideal for use in a scanning program. L.S.

N65-28416 Academy of Sciences (USSR), Moscow.
FURTHER DEVELOPMENT OF THE APPARATUS FOR MEASUREMENTS OF THE PARTICLE TRACKS IN PHOTOEMULSIONS BY THE TELEVISION METHOD
G. E. Belovitsky, A. E. Voronkov, G. B. Zhdanov, L. N. Kolesnikova, V. S. Marenkov et al *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 4 p (See N65-28375 17-24)

Modifications on a semi-automatic device for measuring particle track structure in transverse and longitudinal directions is described. The information on transverse track deflections which is transformed into the amplitude of detuning signal is obtained symmetrically from both edges of the grains (from left and right fronts of the corresponding electric pulse) as against the prior system where information was obtained on only one (left) edge of each grain. The teletype which previously recorded digitized scattering data on paper was replaced with a perforator which plots only first differences of Y-coordinates on a card, and doubles the scattering output. In place of the differential neutron spectrum of length gaps, the integral spectrum which allows a mean slope of the spectrum to be determined is recorded, and the corresponding ionization parameter is determined with considerably greater accuracy. Tests were with the modified apparatus to study its operating characteristics, and curves are shown for parameter fluctuations. L.S.

N65-28418 Kernforschungsanlage, Juelich (West Germany).
IMPROVEMENT OF THE RESOLUTION OF RADIOACTIVE MARKINGS BY TAKING STEREOSCOPIC PICTURES WITH AN ELECTRONIC MICROSCOPE [AMELIORATION DE LA RESOLUTION DE MARQUAGES RADIOACTIFS PAR PRISE DE VUES STEREOSCOPIQUES EN MICROSCOPIE ELECTRONIQUE]
G. Riedal *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 1 p In FRENCH (See N65-28375 17-24)

The use of a stereoscope in conjunction with an electron microscope to separate the images of nuclear traces is described. Two traces with vertical projections less than 0.1 microns apart, which appear as a single trace by two-dimensional view, can be distinguished by means of the stereoscope. Trans. by J.M.D.

N65-28421 Centre de Recherches Nucleaires, Strasbourg (France). Dept. de Physique Corpusculaire.
UTILISATION OF THE ELECTRONIC MICROSCOPE WITh A VIEW TO OBSERVING TRACKS IN IONOGRAPHIC EMULSIONS [UTILISATION DU MICROSCOPE ELECTRONIQUE EN VUE DE L'OBSERVATION DES TRACES DANS LES EMULSIONS IONOGRAPHIQUES]
R. Schmitt, L. Bilwes-Girardin, and M. Nicolae *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 7 p refs In FRENCH (See N65-28375 17-24)

Instances of the use of electron microscopes in observing traces in ionographic emulsions are described, and limitations on the method are discussed. This use of the electron microscope requires special augmentation of the measurement device, and the normal dimensions of the developed grain and their aggregate structure can limit this mode of observation. If the developed grain remains intact, however, keeping essentially the dimensions of the virgin grain, the method is of considerable value. It has been used in study of particles of short lifetimes, such as hyperfragments, and in high resolution autoradiography involving low energy particles such as beta particles emitted from tritium. Trans. by J.M.D.

N65-28530# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SEVERAL NEW PROPOSALS FOR THE MECHANICAL PROJECTION COMPUTERS IN PHOTOGRAMMETRIC STEREOPLOTTERS
Horst Schoeler 29 Apr. 1965 19 p refs Transl. into ENGLISH from a publ. of VEB Carl Zeiss, Jena (East Germany), p 1–7
(FTD-TT-65-248/1+2; AD-462446)

In the first part of the paper an outline is given of the present stage of development in photogrammetric instrument design and construction with special emphasis on developmental trends prevailing in this industry. This introductory part is followed by a detailed discussion of three designs of stereoplotters, which recently attracted much attention. They are prominent for their novel projection systems based on the purely mechanical projection method with separation of the geometrical directions of collimating rays into two sectional planes. The stereoplotter conceived by F. Manek is characterized not only by the horizontal arrangement of the photograms, but also by an extension of the evaluation range, thanks to which photograms taken with cameras with angular fields up to 155g may easily be evaluated. Author

N65-28542*# General Precision, Inc., Glendale, Calif. Librascope Group.
IMAGE ANALYSIS OF AREA-SCAN TELEVISION
7 Mar. 1964 99 p Prepared for JPL
(Contract NAS7-100)
(NASA-CR-63831) CSCL 14E

The problem of reproducing a two-dimensional image at a remote location is examined, and the use of a scanning pattern at both the transmitter and the receiver is studied. Referred to as area-scan television, the system consists of many individual randomly-placed apertures which are illuminated simultaneously. Criteria for judging the quality of a replica, the practical realizability of the mechanically scanning aperture patterns, and the system performance are described. The relative performance of area-scan and single-spot line-scan (spot-scan) television is compared, using as a criterion the replica signal-to-noise ratio as a function of the system parameters. The following are among the conclusions reached: (1) The instrumentation of a spot-scan system is simple and reliable, requiring no high voltage supply and no sweep circuits. (2) The signals emitted by an area-scan television transmitter are secure, as a replica cannot be reproduced by signal interception unless the exact form of the scanning aperture pattern is known. (3) Area-scan television can be used to improve the quality of the received image by reducing the effect of the noise generated in the low-level circuits of the transmitter. M.G.J.

N65-28568 Joint Publications Research Service, Washington, D. C.
CAPACITANCE-TYPE FERRITE TRANSDUCERS
A. A. Bokrinskaya and V. V. Komlik *In its* Izv. VUZov: Radio Eng. 3 Jul. 1965 p 146–152 refs (See N65-28550 17-09)
CFSTI: $5.00

The characteristics of ferrite capacitance transducers were investigated for specimens of polycrystalline yttrium garnet with a high resistivity of 10^{10} ohm per cm; the choice of this material was based on the desire to attain a capacitance with small loss angle. The specimens were made in the shape of spherical ferrites 1.5 mm in diameter. The equivalent capacitance of the transducer are given as a function of temperature for various frequencies, and as a function of frequency for various ambient temperatures. Also, the temperature coefficient of capacitance is proposed as a means of evaluating the temperature sensitivity of ferrite capacitance transducers. The capacitance transducers are most sensitive in the low-temperature range and the magnitude of the temperature coefficient is of the same order as that of higher quality specimens of polycrystalline thermistors. E.E.B.

N65-28593# Aeronautical Research Council (Gt. Brit.)
THE EVALUATION OF SOME COMMERCIAL AND DEVELOPMENT PRESSURE GAUGES IN A LABORATORY TYPE SHOCK TUBE WITH A VIEW TO THEIR SUITABILITY FOR USE IN SHOCK TUNNELS
D. R. Stevens 1964 47 p refs Supersedes RAE-AERO-2814, ARC-23803
(ARC-CP-677; RAE-AERO-2814; ARC-23803) HMSO: 10s

This note describes a simple laboratory shock tube designed to produce rectangular steps of pressure in the range 1 mm Hg to 460 mm Hg for use in evaluating and developing fast response sensitive pressure transducers primarily for shock tunnel use. Test results of three commercially available transducers are presented with brief comments on their characteristics. Two experimental gauges are described with an explanation of the philosophy followed in their design; and their performance determined. It is shown that such gauges are more suitable for our purposes although they are not of a rugged engineering nature. Author

N65-28608# Spectrolab, Inc., Sylmar, Calif.
DESIGN AND FABRICATION OF OPTICAL FILTERS FOR SELECTED LASER FREQUENCIES Interim Technical Report, 1 Mar.–31 May 1965
Samuel J. Holmes 15 Jun. 1965 14 p
(Contract AF 33(615)-2402)
(AD-466027)

Design and fabrication continued on optical filters having laser wavelengths in the 6328 Å helium–neon line, the 1.06 micron neodymium line, and the 3.5 micron neon–xenon line. A mica interference filter technique for fabricating optical interference filters with transmission passbands having half-bandwidths of 1 to 2 Å is described. Two optical helium–neon laser filters were evaluated and calibrated on a 750 mm monochromator having a wavelength resolution of approximately 0.1 Å. Auxiliary filtering is discussed. Data on the angular sensitivity of the filters was taken directly from the monochromator scan for various angles of incidence. R.N.A.

N65-28613# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PHOTOGRAMMETRIC RECORDING INSTRUMENTS. CONSIDERATION OF THE ADVANTAGES AND DISADVANTAGES OF THE VARIOUS RECORDING SYSTEMS
Klaus Szangolies 29 Apr. 1965 25 p refs Transl. into ENGLISH from a publ. of VEB Carl Zeiss, Jena (E. Germany)
(FTD-TT-65-250/1+2; AD-462447)

Instruments were developed which automatically record test values of coordinates, so as to eliminate unavoidable errors in reading and writing, to increase speed, and to make the proper procedure more economical. Recording instruments are used for photogrammetric evaluation as well as for enciphering the test values of definite codes. The conditions for recording on punch cards are similar to those for perforated tapes. The recording on magnetic tapes is identical to the perforated tape method with regard to the number and type of signs. Numerical data characterize the advantage of the recording apparatus although it is defective. Since automatic recording errors in reading are practically nonexistent, the observer is relieved of fatiguing routine work, making this one of the economical advantages of a recording installation. R.W.H.

N65-28614# Air Force Systems Command, Wright-Patterson, AFB, Ohio. Foreign Technology Div.
THE CONTRAST TRANSMISSION THEORY IN PHOTOGRAPHY
R. P. Mark 11 May 1965 23 p refs Transl. into ENGLISH from a publ. of VEB Carl Zeiss Jena (E. Germany) 8 p
(FTD-TT-65-251/1+2; AD-464220)

A contrast transmission function (CT function), which is analogous to the electrical frequency curve, is used as the quality criterion for controlling losses occuring during the transmission of photographic data, and permits a more comprehensive evaluation of the image quality than do classical criteria. Image contrast equations and CT functions are solved for sinusoidal light intensity distribution under two types of atmospheric effects: (1) light dispersion due to haze, and (2) the short angular dispersion effect. Light intensities were measured by integration, by aerial photography flights at various altitudes, using a light meter over a large land area. Other aspects of the image contrast study include image shifting, vibration, the photographic shutter, the lens combination, the emulsion, and the image evaluation. L.S.

N65-28641*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A WIDE-RANGE PIEZOELECTRIC MOMENTUM TRANSDUCER FOR MEASURING MICROMETEOROID IMPACTS
Vernon L. Rogallo and Frank Neuman Washington, NASA, Jul. 1965 64 p refs
(NASA-TN-D-2938) CFSTI: HC $3.00/MF $0.75 CSCL 11B

A new piezoelectric momentum transducer has been developed and tested in the laboratory with low-velocity particles and with simulated micrometeoroids at hypervelocities. The transducer is a simple design incorporating two piezoelectric ceramic beams which serve both as the sensor and as leaf springs. The beams are arranged to support a target in such a manner as to restrict motion primarily to one direction. Although the transducer is very sensitive, capable of momentum measurements of the order of 10^{-5} dyne-sec, it is rugged, being able to withstand high g loads. It can be operated at any altitude with equal sensitivity. When the momentum transducer is used as an impulse detector, the output is directly proportional to the component of impact transferred to the target in a direction parallel to the transducer principal axis. Its sensitivity is essentially independent of the location of impact on the target area. The transducer and associated electronics can be calibrated at various momentum levels by a remote process. Author

N65-28686# Ohio State Univ., Columbus.
A FIELD EVALUATION OF THE KERN DKM3-A ASTRONOMICAL THEODOLITE FOR PRECISE ASTRONOMIC POSITION DETERMINATION
William Eugene Carter (M.S. Thesis) 1965 65 p refs
(AD-614667)

To determine if the astronomic theodolite could provide first-order astronomic latitude and longitude values, a field evaluation was conducted using the observing techniques, numbers of observations, and data reduction methods currently employed by such organizations as the U. S. Coast and Geodetic Survey. Details are given on several components, including the telescope, movable and fixed reticules, the micrometer, striding and double levels, the leveling system, and the precision ball bearing vertical axis system; figures illustrate the text. Calibrations were made against the instrument's vertical circle, and the final accepted value is the result of a series of five determinations. The Horrebow–Talcott latitude method and the Meridian–Transit longitude method were used for precise first-order and modified first-order position determinations; the resulting observations are tabulated. Results of limited observations indicated that the instrument is capable of producing both first-order latitude and longitude determinations; as a field instrument, it is characterized by portability, versatility, and observer convenience. M.G.J.

N65-28698# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MAGNETIC COMPENSATING AMMETER
T. A. Grivin'sh 24 Apr. 1965 4 p Transl. into ENGLISH from Soviet Patent No. 160225 (Appl. No. 784454/26-10, 28 Jun. 1962) 2 p
(FTD-TT-64-1292/1+2; AD-615251)

A sensitive unit is proposed which will enable one to measure dc in solid, liquid, and gaseous conductors by a magnetic compensation method. The proposed sensitive element is designed in the form of a ring in which is a magnetic core made out of ferromagnetic material with a sharply expressed nonlinear curve of magnetism on which are symmetrically arranged two identical windings, connected in parallel to a source of ac and one uniformly distributed compensation winding, connected to a source of dc. For measuring small direct currents on a magnetic core a supplementary winding is provided which is fed by the current to be measured. In order not to disrupt the circuit to be measured when connecting the sensitive unit, it is designed in segments. N.E.A.

N65-28737*# National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.
AUTOMATIC EXTENSOMETER FOR ELASTOMERS
C. D. Hooper 21 Jun. 1965 23 p refs
(NASA-TM-X-53231) CFSTI: HC $1.00/MF$0.50 CSCL 14B

An extensometer was designed for measuring accurately the elongation of elastomers and similar materials and recording this data (by an electronic process) on the chart of the testing instrument. The instrument, which may be used by technicians with a minimum of experience, yields data which are reproducible from laboratory to laboratory since the extension is measured by a semi-automatic process. Although it was designed for accuracy, it is also rugged enough to require no special care in handling, which makes it ideal for operations where numerous routine control tests are conducted. The instrument is adaptable to almost any tensile testing machine conforming to ASTM or Military Specifications and can be fabricated in a normally equipped machine shop at a relatively low cost when compared to most commercial laboratory equipment. Information relative to the design, fabrication, and operation of the extensometer is included in this report, along with photographs and illustrations of the entire unit and components. Author

N65-28791# Federal Aviation Agency, Washington, D. C. Communications Development Div.
CHARACTERISTICS FOR AN AIR TRAFFIC CONTROL RADAR BEACON SYSTEM (ATCRBS) TRANSPONDER IN-FLIGHT MONITOR (TIM)
Kenneth Wise Jun. 1965 7 p
(RD-65-71)

This document describes the operation and use of an ATC Transponder In-Flight Monitor and defines its characteristics. Author

N65-28797# Edgerton, Germeshausen and Grier, Inc., Bedford, Mass.
PHOTOCHROMIC ANTIFLASH SHUTTERS FOR FIRE CONTROL OPTICAL INSTRUMENTS Final Report
P. Larson 15 Nov. 1964 56 p
(Contract DA-19-020-AMC-0225(A))
(B-2923; AD-460426)

Reversible photochromic shutters were designed, fabricated and tested to verify the feasibility and practicability of this type of device as an operational antiflash shutter for optical sighting and fire control instruments. Two different prototype systems were developed, and laboratory tests demonstrated that both equalled or exceeded the basic performance requirements of the contract. The XSY-118 System (for the M43 Periscope) has an open transmission of 55%, a closed density of 3.5, and a closure time of 50 microseconds; the XSY-117 Photochromic Shutter System (for the XM112 Telescope) has an open transmission of 69%, a closed density of 2.9, and a closure time of 75 microseconds. Although the prototype systems demonstrate the practicality of the photochromic shutter as an operational antiflash device, further research and development are recommended. Ultimately, a shutter with an open transmission limited only by the surface reflection losses in the optical elements (90–95% open transmission) and a closed density of 3.0 or more is possible. Author

N65-28800# Trans-sonics, Inc., Burlington, Mass.
GRAPHITE STRAIN TRANSDUCER Final Report
Thomas A. Cederlund Griffiss AFB, N. Y., RADC, Apr. 1965 41 p refs
(Contract AF 30(602)-3276)
(RADC-TR-65-38; AD-465904)

This study was conducted to determine the applicability of using a graphite monoparticulate layer transducer as a means of detecting sound vibrations in diaphragms. Interest for this study was provided by reported gauge factor values of several thousand in strain gauges using this graphite monolayer technique. Techniques were developed for the formation and deposition of monoparticulate graphite layers and their transfer to thin film substrates. Evaluation of deposited graphite layers as strain gauges showed gauge factors of 800 for strains of 500 microinches per inch. For strains of less than 50 microinches per inch, gauge factors decrease rapidly. Transduced audio signals, when detectable above the background noise of the sensor, are distorted and for the most part unintelligible. It is concluded that, because of sensor generated noise and the small changes in transducer resistance developed by low strains, the graphite monoparticulate sensor is not an optimum method to transduce audio vibrations in diaphragms. It appears, however, that the graphite monolayer transducer might have important application when sufficient strain is produced and where high gauge output is beneficial. Author

N65-28807*# Consolidated Controls Corp., Bethel, Conn.
PRESSURE MEASURING SYSTEMS FOR CLOSED CYCLE LIQUID METAL FACILITIES Fifth Quarterly Report, 1 Mar.–31 May 1965
Anthony J. Cassano 28 Jun. 1965 43 p refs
(Contract NAS3-4170)
(NASA-CR-54439; CCC-508) CFSTI: HC $2.00/MF $0.50 CSCL 14B

Continuing development of a pressure transducer system for liquid metal applications is described. During the report period, emphasis was placed upon fabrication of an experimental transducer incorporating a thermionic diode sensor. Problems encountered in fabricating the transducer are outlined along with the anticipated solutions. A potassium compatibility test facility has been constructed and checked out. A complete set of single convolution pressure capsules and electrical terminals has been charged with liquid potassium and is undergoing the initial stages of the compatibility test procedure. Preliminary analyses are presented for different configurations of differential pressure transducers. Author

N65-28848*# Goerz Optical Co., Inc., Inwood, N. Y.
ENGINEERING STUDY PROGRAM TO DETERMINE THE OPTIMUM DESIGN FOR A HAND HELD CAMERA TO BE USED ON THE LUNAR SURFACE Final Report
4 Jun. 1965 130 p
(Contract NAS9-3583)
(NASA-CR-65051; P-426A) CFSTI: HC $4.00/MF $1.00 CSCL 14E

The optimum design for a hand held stereo camera was determined considering the types of data to be taken, the environmental conditions, the limited dexterity of the space-suited astronaut, and the allowable space and weight. The scope of the study was limited by time and funding to a preliminary investigation of the best compromise between a wide array of conflicting capability requirements, a harsh environment, a somewhat limited photographer, and a severe limitation on space and weight. The study shows that each of three types of cameras provides a high degree of versatility and utility to the Apollo Program and gives design data, layout drawings, and specifications to guide the detailed design and fabrication of the camera type or types selected. E.E.B.

N65-28884# Atomic Weapons Research Establishment, Aldermaston (England).
A BALANCE FOR USE IN THERMOGRAVIMETRY INVOLVING RADIOACTIVE MATERIALS
K. C. Steed, H. F. Green, D. R. Terrey, and F. Brown Apr. 1965 41 p refs
(AWRE-O-14/65) HMSO: 7s

A thermobalance is described for use with radioactive materials, which may be operated manually or automatically. Weight changes of up to 5 g may be measured with a precision of ±0.5 mg. The fully enclosed construction of the thermobalance enables reactions to be carried out under static, flow or vacuum conditions. Author

N65-28902# Weapons Research Establishment (Australia).
READOUT DEVICE FOR ANGLE OF ARRIVAL MEASUREMENTS
J. Downing Feb. 1964 65 p
(WRE-CPD(T)-105)

A device is described which may be used to record time and the angle which a trace makes on a cathode ray oscillograph. Author

N65-28916*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
THEORY AND OPERATION OF A VARIABLE EXPOSURE PHOTOGRAPHIC PYROMETER OVER THE TEMPERATURE RANGE 1800° TO 3600°F (1255° TO 2255°K)
Reginald J. Exton Washington, NASA, Mar. 1965 19 p refs
(NASA-TN-D-2660) CFSTI: HC $1.00/MF $0.50 CSCL 14B

The instrument described in this report is a device which attenuates, by known amounts, the light intensity received from a radiating source by use of a variable-density filter. The attenuated beams are photographed, and the measured film densities, together with their associated filter values, yield a time history of the temperature contour. The theory, experimental procedure, and errors associated with the prototype instrument and an advanced model are discussed. The "photographic pyrometer" is capable of yielding high surface-temperature

contours for large surface areas. As presently calibrated, the blackbody-temperature range for the prototype is from 1800° to 3600° F (1255° to 2255° K) with a precision of approximately 2 percent for most applications. The advanced model theoretically extends the upper temperature limit to 4500° F (2755° K). Author

N65-28922# Atomics International, Canoga Park, Calif.
SUPERCONDUCTING NUCLEAR PARTICLE DETECTOR
Trimonthly Report, 15 Feb.–15 May 1965
[1965] 16 p refs
(Contract DA 18-035-AMC-107(A))
(AI-65-108; AD 615343)

Electron-electron and electron-phonon interactions in thin films are discussed. Digital computer solutions were carried out for the nonlinear partial differential equation that results if lattice heat is included in the calculations. A series of indium films was evaporated on quartz and glass discs, and used to examine the tentative conclusion that the lattice plays no significant role in the dynamics of alpha detection. A series of film testing probes was constructed and tested. TAB

N65-28966# Army Materials Research Agency, Watertown, Mass. Materials Technology Div.
PROPOSED NEW PENETRAMETER DESIGNS WHICH PROVIDE FOR ALL NECESSARY RADIOGRAPHIC QUALITY LEVELS
Ernest H. Rodgers May 1965 14 p refs
(AMRA-MS-65-02; AD-615402)

Penetrameter designs are described which provide for quality levels of 1-1T, 1-2T, 2-1T, 2-2T, 2-4T, and 4-2T for materials thicknesses up to 3.0 inches; 1-1T, 1-2T, 2-1T, 2-2T, and 2-4T for material thicknesses of 3.0 to 9.0 inches; and 1-1T, 1-2T, 2-1T, and 2-2T for material thicknesses over 9.0 inches. TAB

N65-28967# Naval Research Lab., Washington, D. C.
PORTABLE DETECTOR FOR MIXED HYDRAZINES PROPELLANT FUEL VAPORS AT LOW CONCENTRATION
Final Report
E. I. Smith, Jr. and H. E. Moran, Jr. Apr. 1965 16 p
(NRL-MR-1602; AD-614821)

Paradimethylaminobenzaldehyde (DMABA) was examined as a color forming agent for the colorimetric determination of mixed hydrazines propellant fuel vapor in air. Contaminated air was drawn through a filter paper disc which had been moistened with DMABA solution. The reaction between the fuel vapor and the indicator produced a yellow color. Air was drawn through the indicator until the yellow color matched an arbitrarily selected standard yellow color. The volume of air required to produce the standard color was related to the concentration of fuel vapor in the air over the range of 0.5 to 10 ppm. Several gases which might be found in the air at least occasionally were examined for interference with the fuel vapor test. Ammonia at 50 ppm did not interfere, but higher concentrations either decreased the indicator sensitivity or completely inhibited color formation. Sulfur dioxide at 500 ppm did not interfere with the test; higher concentrations did interfere. Carbon dioxide at concentrations up to 50,000 ppm (5%) did not affect the test. Chlorine at 2 and 5 ppm reduced the sensitivity of the test indicator. Fifty ppm and higher concentrations of chlorine formed brown or green colors with the indicator, thus interfering with the fuel vapor test. Author

N65-28975# Virginia Polytechnic Inst., Blacksburg.
AN ON–OFF SYSTEM FOR STABILITY AND CONTROL OF A SPINNING SPACECRAFT
John G. Shearin (M.S. Thesis), Apr. 1965 48 p refs

An analytical and experimental study of an on-off jet system for stability and control of a rotating manned space station has been performed. The control laws are incorporated with the nonlinear equations of motion of a space station, and the response to internal disturbances on the station has been investigated. These studies have been carried out on a digital computer. Experimental results of a similar jet system, as well as the computer results, are presented. Descriptions of the experimental facilities are also included. Author

N65-28996# Texas Instruments, Inc., Dallas. Apparatus Div.
MICROELECTRIC FREQUENCY AND TIME STANDARD
Quarterly Progress Report No. 2, 1 Oct.–31 Dec. 1964
15 Jan. 1965 84 p refs
(Contract NObsr-91352)
(U2-807240-2; AD-610503)

Progress on the program has been slower than desired during this reporting period. The major problem has been that of obtaining parts. Design progress has been satisfactory. The oscillator oven design is being modified because of marginal thermal control in the first prototype. A new design will increase the size by one-half inch in diameter and more insulation will be added. All interface circuit design has been completed. The logic design has been modified to simplify some of the functions. All other circuit design has been completed except the final evaluation of the power output stage of the distribution amplifiers and the −6-volt regulator for the oscillator and main system power supplies. In addition, thermal analyses have been made of the heat rise in each drawer. The heat rise in the oscillator drawer must be kept to a minimum in order to obtain stable, efficient operation in a 50° C environment. Author

N65-28997# Army Engineer Research and Development Labs., Fort Belvoir, Va.
RECTIFICATION OF AERIAL PHOTOGRAPHS ON THE PHOTOSTEREOGRAPH
P. S. Aleksandrov [1965] 6 p refs Transl. into ENGLISH from Geodez. i Kartograf. (Moscow), no. 7, 1964 p 46–48
(T-1766; AD-610476)

The rectification of aerial photographs by an instrument known as the photostereograph is described. In rectifying the photographs on the instrument, a model of the terrain is constructed and its outer orientation is formulated. Exposure is by means of an orthogonal beam through a slit, the size of which depends on the relief. In the process of rectification the mark is always kept on the surface of the stereomodel by motion in the direction of the Z-axis in order to eliminate differences in scale of the aerial photograph due to differences in the camera altitude. If the model is not exactly level, the projection will be onto an inclined plane. The combined influence of the relief and leveling errors are discussed. Estimates of the accuracy of the method are included. E.E.B.

N65-29088# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ELECTROINDUCTIVE INSTRUMENT FOR CHECKING DIMENSIONS AND DETECTING FLAWS IN METAL PRODUCTS
A. T. Nikolayenko and N. L. Bondarenko 19 Apr. 1965 5 p Transl. into ENGLISH from Soviet Patent No. 155291 (Appl. No. 784245/25-8, 26 Jul. 1962) 3 p
(FTD-TT-64-1282/1+2; AD-614964)

The object of the invention is an electroinductive instrument for checking dimensions and detecting flaws in metal products based on the method of excitation and recording in a controllable area of eddy currents, which contains an inductive pickup, a comparison pickup, a generator of electrical oscillations, an amplifier, an indicator, and electrical elements of regulation. To reduce the temperature error of the measuring pickup and to increase the precision of checking, the coil of the pickup is provided with an additional winding wound with double wire which is soldered at one end. The free ends of the wire are included in the circuit of the automatic compensator on the axis of the motor of which there are mounted slides of the elements of the temperature compensation of the measuring bridge. TAB

N65-29090# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ELECTROMAGNETIC FLAW DETECTOR
I. P. Parshin and P. I. Beda 19 Apr. 1965 5 p Transl. into ENGLISH from Soviet Patent No. 156735 (Appl. No. 779612/25-8, 24 May 1962) 3 p
(FTD-TT-64-1284/1+2; AD-614966)

In the proposed flaw detector the principle of comparison of two articles of the same type (the tested and the standard) is used for checking two symmetrically placed surfaces of one item with the aid of two differentially connected-up pickups. A defect on one of the two simultaneously checked surfaces creates an imbalance in the voltages in the differential scheme of connecting in the pickups causing the needle of the checking instrument to deviate. The direction of the deviation of the needle indicates which of the checked surfaces has a flaw. TAB

N65-29093# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MAGNETOSTATIC PRISM FOR ADJUSTING OF ELECTRON MICROSCOPE
P. A. Stoyanov 5 May 1965 4 p Transl. into ENGLISH from Soviet Patent No. 160780 (Appl. No. 820653/26-10, 19 Feb. 1963) 2 p
(FTD-TT-64-1380/1+2; AD-615886)

A magnetostatic prism is proposed for adjusting an electron microscope. It contains a revolving permanent magnet, creating a magnetic field, perpendicular to the optical axis of the microscope, and is distinguished by simplicity of design. It is provided with a screen moving along the axis, the screen being designed in the form of a cylinder, the geometrical axis of which is superimposed on the optical axis of the microscope, while the shifting of the screen and the turning of the magnet is accomplished by one general drive, or by two independent ones. Author

N65-29101# ARO, Inc., Arnold Air Force Station, Tenn.
LIGHT ENERGY REACHING THE GRATING OF A SPECTROMETER
W. E. Bair Arnold Eng. Develop. Center, Jul. 1965 18 p ref
(Contract AF 40(600)-1000)
(AEDC-TR-65-125; AD-465892)

The effective field of view of a spectrometer, when used with an external collecting lens, is shown to be defined by the width and height of the image of the slit. The energy, E_λ, of wavelength λ, which reaches the grating of the spectrometer, is very closely approximated as

$$E_\lambda = \frac{wh}{\pi}\left[\sin^{-1}\left(\frac{d^2}{4\bar{z}^2 + d^2}\right)\right] I_\lambda \, dz$$

where
w = width of slit image
h = height of slit image
d = width of lens stop
$\bar{z}$ = distance from slit image to lens
I_λ = intensity of light emitted
z = coordinate distance from slit image toward lens
Author

N65-29104# Army Missile Command, Huntsville, Ala. Instrumentation Branch.
SIMULATION OF AN ATTITUDE DETERMINING SYSTEM UTILIZING MAGNETOMETERS AND EARTH'S HORIZON SENSOR
William F. Baxter 31 May 1965 27 p
(RG-TR-65-11; AD-466549)

This report presents experimental data obtained by partial simulation of a missile attitude determination system consisting of magnetometers sensing the earth's magnetic field and a sensor responding to the earth's horizon. The contribution of various errors to system error is outlined. A basis is provided for possible future work concerning the effect of onboard interference. Author

N65-29122# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A METHOD OF MEASURING THE FLOW RATE OF LIQUIDS AND GASES AND A DEVICE FOR EXPLOITING THE METHOD
A. Sh. Kiyasbeyli, M. Ye. Perel'shteyn, and R. Ye. Aramyan 13 Apr. 1965 5 p Transl. into ENGLISH from Soviet Patent No. 161520 (Appl. No. 825278/26-10, 15 Mar. 1963) 2 p
(FTD-TT-64-1193/1+2; AD-614958)

The proposed method offers the possibility of measuring the weight consumption of a liquid or gas by means of measuring with a computing device the ratio of the drop in the pressure occurring on the pickup of an acoustic flowmeter and converted into an electric signal, to an electric signal from the acoustic flow meter. The flow converter of the pressure is connected in parallel to the acoustic flow meter; the measuring element of the flow converter is connected to one input of the computing device the other input of which is connected with the converter of the acoustic flow meter. TAB

N65-29137*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DESIGN AND TEST PERFORMANCE OF MARINER IV TELEVISION OPTICAL SYSTEM
R. A. Becker 1 Jul. 1965 12 p
(Contract NAS7-100)
(NASA-CR-63910; JPL-TR-32-773) CFSTI: HC $1.00/MF $0.50 CSCL 17B

Reported in this paper are the development and testing of the television optical system for *Mariner IV*. System performance under simulated conditions of launch and space environment are described. Analyses of the specific capability requirements and of the design considerations for such a system are included. Also discussed are the special problems of the filter-shutter mechanism, the selection of lubricants, and the use of nonmetallic materials for certain parts in the system. Expected results of the photographic mission are defined. Author

15 MACHINE ELEMENTS AND PROCESSES

Includes bearings, seals, pumps, and other mechanical equipment; lubrication, friction, and wear; manufacturing processes and quality control, and reliability; drafting; and materials fabrication, handling, and inspection.

N65-28108# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PETROLEUM SPECIALIST Selected Articles
19 Jan. 1965 5 p Transl. into ENGLISH from Neftyanik (USSR), v. 4, no. 12, 1959 p 27
(FTD-TT-64-778/1; AD-610794)

CONTENTS:
1. ADDITIVE TO HEAVY HIGHLY SULFUROUS ENGINE FUELS T. Skichko p 1
2. ANTICORROSION ADDITIVE TO LUBRICANTS T. Skichko p 2

N65-28119# IIT Research Inst., Chicago, Ill. Technology Center.
INTERFACE FRICTION IN HOT METAL DEFORMATION Final Report, 23 May 1964–23 May 1965
J. A. Schey and F. A. Shunk 11 Jun. 1965 78 p refs
(Contract NOw-64-0458-f)
(IITRI-B6027-6; AD-465991)

An investigation was carried out on interface friction between workpiece and die material under conditions of hot plastic deformation. The plane–strain compression technique was used for determining the magnitude of friction between 7075 Al, Ti-6Al-4V, 4130 steel, TZM, Inconel X750 and Be specimens (representing the workpiece) and 4340, H-11, WC and Al_2O_3 anvils (representing the die). Calculated coefficients of friction, combined with observations of surface appearance, showed that sticking friction is the dominating mechanism. Sliding friction was promoted by some oxides formed on specimens and, possibly, by some surface treatments applied to anvils. Author

N65-28156# Schjeldahl (G. T.) Co., Northfield, Minn. Advanced Programs Div.
LIGHTWEIGHT REINFORCED BALLOON MATERIAL INVESTIGATION Final Report, 1 Oct. 1964–31 Mar. 1965
John A. Mac Fadden 20 Apr. 1965 18 p
(Contract Nonr-4096(00))
(AD-614571)

Lightweight reinforced Mylar balloons can be fabricated under clean conditions, and laboratory data indicate that 0.25 mil Mylar is suitable for zero pressure balloon production. A newly-developed sealer, with 1-1/8 inch wide folded tape, permits sealing at the rate of 500 feet per man-hour and the reduction of balloon costs. A resealing feature was incorporated in the folded tape sealer, and a technique for localized repair of the sealer was established. It is suggested that a lightweight nonblocking balloon material be fabricated by laying adhesive-coated threads directly on the light-gage Mylar and curing the resulting web while it is separated by a release material. Details are given concerning leakage in previously constructed balloons, development of material handling and gore laying techniques, preparation of seals and the sealer developed, and fabrication and installation of accessories and end fittings. M.W.R.

N65-28197# Army Materials Research Agency, Watertown, Mass. Materials Engineering Div.
A REPORT GUIDE TO LITERATURE IN THE FIELD OF ELECTROMAGNETIC TESTING
Robert C. Grubinskas and Charles P. Merhib Apr. 1965 94 p refs
(AMRA-MS-65-03; AD-615346)

Abstracts are presented on nondestructive electromagnetic test methods for engineering materials, including magnetic materials, which use electromagnetic energy having frequencies less than those of visible light to yield information regarding the quality of material tested. R.N.A.

N65-28198# Lockheed Missiles and Space Co., Sunnyvale, Calif.
SPECIFICATION AND MEASUREMENT OF THE RELIABILITY OF PARTS OF GUIDED MISSILES AND SPACE VEHICLES
Erich Pieruschka [1961] 51 p refs
(LMSC-800920; AD-615596)

The study discusses the statistical techniques of measuring high reliabilities; it introduces the quotient of inaccuracy of the measurement of reliability; it investigates the economic and experimental consequences of measuring high reliabilities with an acceptable accuracy; and it discusses the possibilities of meaningful specification for parts of guided missiles and space vehicles. Finally, an upper limit of space vehicle reliability is estimated on the basis of the achieved reliability of intercontinental ballistic missile types. Author

N65-28199# Cornell-Dubilier Electronics Div., Federal Pacific Electric Co., Norwood, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE PRODUCTION OF SILICON MONOXIDE CAPACITORS MICROELEMENT Quarterly Report, 1 Dec. 1964–28 Feb. 1965
J. J. O'Connor [1965] 21 p
(Contract DA-36-039-AMC-01478(E))
(QR-7; AD-615543)

Unreliable quality and general lack of availability of glazed and metalized microelement wafers from commercial suppliers have necessitated the addition of a glazing operation to the microelement fabrication process. Results of the initial 2000-hour life test of early, non-heat-treated 560 pf microelements indicate that the capacitors improve rather than degrade. This improvement is most evident in the insulation resistance parameter. Preproduction long-term life tests have commenced for all the microelement types including a new test for the 560 pf units. A summary of electrical parameters is given for all the units (data taken prior to their being placed on life test). Author

N65-28209# Allegheny Ludlum Steel Corp., Brackenridge, Pa.
TANTALUM ALLOY TUBING DEVELOPMENT PROGRAM Fifth Interim Technical Engineering Report, 15 Jul. 1964–31 Mar. 1965
F. S. Turner Wright-Patterson AFB, Ohio, Res. and Technol. Div., Apr. 1965 35 p refs
(Contract AF 33(657)-11261)
(RTD-TR-8-109 (V); AD-614602)

Ta-10W alloy was successfully extruded to 2.060-inch O.D. by 1.440-inch I.D. tube hollows from a 5-inch liner system on a 2,200 ton press. The billets were heated and extruded bare from a billet temperature of 3100F using a glass lubrication system.

The T-222 alloy billets were also successfully extruded from a temperature of 3000F but it was necessary to can the T-222 billets in unalloyed molybdenum in order to lower the extrusion pressures. Results of the post-extrusion processing and evaluation in terms of hardness, room temperature, tensile properties, metallographic examination, response to heat treatment and chemical analysis are presented. Author

N65-28232# Climax Molybdenum Co. of Michigan, Ann Arbor.
RESEARCH AND DEVELOPMENT ON NEW PROCESSES OF PRODUCING DUCTILE MOLYBDENUM Final Report, 1 Nov. 1961–31 Oct. 1964
M. Semchyshen, Robert Q. Barr, and A. Phillip Coldren 30 Apr. 1965 140 p refs
(Contract NOrd-15915)
(AD-615544)

Studies were conducted on a laboratory scale with the objective of lowering the transition temperature of arc-cast molybdenum. One of the approaches which was pursued involved experiments which attempted to improve the purity of arc-cast molybdenum. Another second group of experiments involved additions of elements which would tend to mitigate the deleterious effect of interstitial impurities. Author

N65-28269 Joint Publications Research Service, Washington, D. C.
INVESTIGATION OF ONE METHOD OF COMPENSATING FOR FRICTION IN SUPPORTS OF INSTRUMENT SHAFTS
B. A. Komashinskiy *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 134–139 refs (See N65-28250 17-10) CFSTI: $5.00

Described is a method for reducing mechanical losses in instrument supports caused by friction, which focuses on the use of forced rotation on the outer races of ball bearings in the supports of instrument shafts. The selection of a speed of rotation is substantiated, and examples are cited which illustrate the effectiveness of the method. S.C.W.

N65-28323# Cornell-Dubilier Electronics Div. Federal Pacific Electric Co., Norwood, Mass.
PRODUCTION ENGINEERING MEASURE FOR CAPACITORS, FEED-THROUGH, SOLID ELECTROLYTE TANTALUM PELLET Quarterly Report, 1 Jan.–31 Mar. 1965
W. G. Bailey [1965] 61 p
(Contract DA-36-039-AMC-03630(E))
(QR-4; AD-615344)

Manufacturing and low impedance production aging was completed on the four lots of preproduction samples. Production testing was completed with a yield of 73.5%. All units were submitted to quality control for preproduction qualification testing. The life test was started without circuit impedance. Life test failures in excess of the specification limits occurred. A TAR of proposed corrective action was submitted. Preproduction inspection testing was continued. Author

N65-28344*# Pressure Technology Corp. of America, Woodbridge, N. J.
AN INVESTIGATION OF FLUID EXTRUSION OF METALS Final Report
A. Bobrowsky and E. A. Stack 27 Feb. 1965 168 p refs
(Contract NASw-742)
(NASA-CR-63789) CFSTI: HC $5.00/MF $1.00 CSCL 13 H

The fluid-to-fluid extrusion at room temperature of fully hardened maraging steel is reported. This material had a initial yield strength above 270 000 psi. Also, it was demonstrated that a wide variety of lubricants was suitable for fluid-to-fluid extrusion of steel, and that the use of a back pressure in fluid-to-fluid extrusion produces extruded metal of higher strength and better ductility. Further, pressurizing a jacketed specimen was found to improve the yield strength of Cr-MgO. Also, stretching under pressure improved yield strength and ductility of this material, and pressurization alone removed the upper yield point. The minimum pressure for room-temperature working of tungsten alloy with 4.5% Ta was found to be 260 000 psi. HfC and MgO were found to be too delicate for suitable test by present techniques. E.E.B.

N65-28366*# Southern Research Inst., Birmingham, Ala.
EVALUATION OF THE PERFORMANCE OF SEVEN REFRACTORY METAL THERMOCOUPLES Final Report
11 Jun. 1965 56 p
(Contract NAS8-5196)
(NASA-CR-63809) CFSTI: HC $3.00/MF $0.50 CSCL 20 N

Seven refractory metal thermocouples made of tungsten or tungsten–rhenium alloys were calibrated and evaluated. The calibrations were performed in an inductively heated tungsten blackbody cavity and in an oxy-acetylene flame. The evaluations included studies of the effect of immersion depth on thermocouple response time and maximum electromotive force output. Several calibrations on two of the thermocouples revealed data scatter of approximately 25%. The scatter was attributed to a shorting effect caused by the central wire contacting the outer sheath at more than one location. Two second generation thermocouples exhibited more consistent behavior. Another thermocouple failed on the initial exposure at 3950° F and still another had an open circuit and could not be calibrated. R.N.A.

N65-28504# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FRICTION COEFFICIENTS OF MATERIALS FOR GUIDE MACHINES
G. B. Lur'ye 19 Apr. 1965 10 p Transl. into ENGLISH from Stanki i Instrument (USSR), v. 30, no. 3, 1959 p 17–19
(FTD-TT-64-1179/1+2; AD-615229)

Experiments were conducted to determine friction in slide guides, operating at feeding rates. A comparative evaluation was made of the antifriction properties of numerous materials used for strap guides. Values were derived of friction coefficients in dependence upon the duration of the stationary contact and sliding speed. Materials tested during friction along the cast iron included: metals (cast iron SCH 2.-40, bronze Br. OTSS 6-6-3, babbit B16, zinc alloys TSAM 30-4 and TSAM 10-5); plastics (metallurgical Textolite B, polyamide resin 68 of Nylon type, textolite PT, cordovoloknite 1-G, vinyl plastics, fluoro plastic-4) and graphite coated materials (ferrographite, anticorrosion heat conductive ATM material, bronze-graphite, graphite coated material type D, lead saturated). Author

N65-28532# Naval Ordnance Lab., White Oak, Md. Chemistry Research Dept.
SOME PROPERTIES OF BERYLLIUM WIRE REINFORCED NOL RINGS Final Report
Marlin A. Kinna Jul. 1965 32 p refs
(NOLTR-64-24; AD-465419)

Beryllium wire reinforced plastics composite rings exhibited a tensile modulus of 22.6×10^{11} dynes/cm^2 (31.3×10^6 psi). This value represents a four-fold increase over typical modulus values for glass fiber reinforced rings. An ultimate tensile strength of 11.0×10^9 dynes/cm^2 (159,700 psi), which is equivalent to the strength levels obtained for glass reinforced rings, was also measured. Samples prepared with a combination glass fiber-beryllium wire reinforcement had significantly higher tensile and compressive moduli than all-glass fiber reinforced specimens. Author

N65-28621# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
WHAT WILL THE MAINTENANCE TOOLS OF ASTRONAUT–MECHANICS BE LIKE?
29 Apr. 1965 6 p Transl. into ENGLISH from Nauka i Zhizn (Moscow), no. 8, 1964 p 124–125
(FTD-TT-64-1256/1+2; AD-615240)

Maintenance tools for astronaut–mechanics while in flight are under study. Engineers have proposed for the mechanics of spaceships and orbiting stations a hybrid of the flat-nosed pliers and a nut wrench. Also, an electric tool that can perform the function of a screwdriver, nut wrench, grinding wheel, and tap was considered. R.W.H.

N65-28624# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHOD OF IMPROVING THE ANTIWEAR PROPERTIES OF LUBRICATING OILS
V. S. Demchenko, Ye. N. Gur'yanova, and O. I. Bogdanova 19 Apr. 1965 4 p Transl. into ENGLISH from Russian Patent No. 158038 (Appl. No. 783882/23-4, 23 Jun. 1962) 2 p
(FTD-TT-64-1287/1; AD-615250)

The object of the invention is a method improving the antiwear properties of lubricating oils which is distinguished by the fact that as additives one introduces derivatives of 2-mercaptobenzthiazole, for example, benzthiazole-2-cyclohexylsulfenamid. Author

N65-28629*# Pratt And Whitney Aircraft, Middletown, Conn.
CAVITATION DAMAGE OF MECHANICAL PUMP IMPELLERS OPERATING IN LIQUID METAL SPACE POWER LOOPS
Robert S. Kulp and James V. Altieri Washington, NASA, Jul. 1965 119 p refs Film supplement to this report is available on loan from NASA, Washington
(Contract NAS3-2541)
(NASA-CR-165)

A three vaned centrifugal pump impeller, designed for high suction specific speeds, was endurance tested as part of a turbopump in 1400F potassium at a suction specific speed of 20,000 to determine the extent of cavitation damage. The endurance test was terminated after 350 hours due to performance deterioration and increased vibration. Post-test examination of the impeller showed mild cavitation pitting on inlet pressure surfaces of the vanes and variable amounts of damage on back channel pressure surfaces with a maximum penetration of about 0.050 inch. Complete water calibration of the impeller was done prior to the liquid metal test to determine cavitation patterns and tentatively select test conditions for the endurance test. Attempts were made to correlate cavitation noise with visual data during the impeller test. The complete turbopump was tested in water to determine collector effects on impeller performance and to finally select the endurance test point. Author

N65-28669# Franklin Inst., Philadelphia, Pa. Research Labs.
DESIGN GUIDE FOR GAS-LUBRICATED TILTING-PAD JOURNAL AND THRUST BEARINGS WITH SPECIAL REFERENCE TO HIGH-SPEED ROTORS, 1961–1964
E. J. Gunter, Jr., J. G. Hinkle, and D. D. Fuller Nov. 1964 231 p refs
(Contract AT(30-1)-2512)
(NYO-2512-1; I-A2392-3-1)

Design information is presented on self-acting, gas-lubricated, tilting-pad journal and thrust bearings, for their application to high speed rotating equipment. The geometry, governing equations, and performance curves for journal bearings are discussed. The dynamic characteristics of rotors are reviewed, and a sample calculation for a typical rotor journal bearing is given. Bearing materials are considered. Also included are appendices giving equations for the derivation of pivot circle clearance, the least square error fit, and shaft whirl dynamics, and a table listing viscosities of gases at varying temperatures. L.S.

N65-28697# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AT THE TECHNICAL-ECONOMICAL COUNCIL OF THE LENINGRAD SOVNARKHOZ
Ye. K. Terent'yev 23 Apr. 1965 5 p Transl. into ENGLISH from Byull. Tekh.-Ekon. Informatsii (Moscow), no. 2, 1964 p 76–77
(FTD-TT-64-1242/1; AD-615288)

Information regarding the use of molybdenum disulfide as an antifriction coating was reported to the technological section of machine construction of the technical-economical soviet of the Leningrad Sovnarkhoz (Council of National Economy). The use of molybdenum disulfide is reported to increase, by an average of 2 to 3 times, the stability of cutting tools and dies. Author

N65-28723# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHOD OF PRODUCING NONFLAMMABLE LUBRICANTS FOR TURBINES
K. I. Ivanov, Ye. D. Vilyanskaya, and L. N. Kirichenko 28 Apr. 1965 5 p Transl. into ENGLISH from Soviet Patent No. 159922 (Appl. No. 807683/23-4, 13 Dec. 1962) 2 p
(FTD-TT-64-1291/1; AD-615297)

The object of the invention is a method of obtaining a fire-resistant liquid for turbines on the basis of compounds containing phosphorus with additives. To improve the quality of the product and reduce its cost, trixylinylphosphate is used as the phosphorus compound, perfluorinated transformer oil as an antifoaming additive and 4,4(1)-diamino-diphenyl-disulfide as an antioxidant. Author

N65-28833# United Kingdom Atomic Energy Authority, Harwell (England). Engineering Div.
EXPERIMENTAL WORK AT A.E.R.E. ON THE DEVELOPMENT OF PACKAGING FOR RADIOACTIVE MATERIALS WHICH WILL MEET THE I.A.E.A. REGULATIONS
F. E. Dixon and A. H. Partridge Apr. 1965 38 p refs
(AERE-R-4810) HMSO: 7s

This series of experiments covers work performed since 1962 when the report TCAP/P 64/65 covering the earlier work was published. The two more important series of experiments are those covering (1) The development of expendable type "B" packaging (2) Tests leading to the development of a ventilated type B large source package. Other tests covered plastic packaging, small packages for exempt quantities of fissile materials, the three ton drop test, model tests and pressure tests. Author

N65-28845# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
NATURE OF POLYSILOXANES AND ITS EFFECT ON THEIR ACTION AS ADMIXTURES TO HYDROCARBON LUBRICATING AGENTS
G. V. Vinogradov, N. S. Nametkin, and M. I. Nosov 26 Apr. 1965 10 p refs Transl. into ENGLISH from Neftekhimiya (USSR), v. 4, no. 2, 1964 p 345–350
(FTD-TT-64-1268//1+2; AD-615245)

To explain the effect of the nature of polysiloxanes on the improvement of the lubricating effect of hydrocarbons during their addition into same, the antiwear and antifriction properties of mixtures of 1,1-di(o-xylyl)-ethane with polyethylsiloxane, polymethylsiloxane and two polymethylphenylsiloxane liquids were investigated. Mutual strengthening of the lubricating effect of polysiloxanes and hydrocarbons depends to a large degree upon the nature of polysiloxanes, which by degree of reducing their activity as admixtures, improving the lubricating qualities of hydrocarbons, are arranged in the following series: Polyethylsiloxane > polymethylsiloxane > polymer 1 > polymer 2. An assumption was made that this is connected with a rise in thermooxidizing stability during the change in polysiloxane chanins of ethyl side groups into methyl and phenyl. Mutual strengthening of the lubricating effect of hydrocarbons and polysiloxanes may appear not only then when they are soluble in each other but also when they are emulsified in hydrocarbon media.

Author

N65-28851*# Honeywell, Inc., Minneapolis, Minn. Aeronautical Div.

STUDY PROGRAM TO DETERMINE THE ACCELERATION ENVIRONMENT CAPABILITY OF THE GG159C GAS-BEARING SPINMOTOR Final Report Supplement

G. J. Erickson 10 Aug. 1964 6 p Prepared for JPL

(Contracts NAS7-100; JPL-950604)

(NASA-CR-73844; Rept.-1727-FR-2) CFSTI: HC $1.00/MF $0.50 CSCL 13G

Two operating GG159C gas bearing motors were subjected to g environments sufficient to cause bearing contact while operating and then placed on 500 hour life tests. Two more motors were subjected to the same g environments while nonoperating and then placed on life test. The operating gas bearing motors were found to be superior to the nonoperating motors in the ability to reliably operate after exposure to environments of 200 g 1.5-millisecond shock and 25 g rms (20 to 2000 cps) random vibration. The life test results for each motor are listed.

R.N.A.

N65-28862# Advisory Group for Aeronautical Research and Development, Paris (France).

COMPOSITE MATERIALS [MATERIAUX COMPOSITES]

G. Dixmiter and George Gerard Jul. 1964 57 p In ENGLISH and FRENCH

(AGARD-483)

Composite materials are becoming increasingly important in various areas of aerospace design. Specific aspects of composite materials have been brought to the fore by the successful use of reinforced plastics as high strength materials. This achievement has called attention to the mechanism of the reinforcement of a low modulus matrix by high modulus, high specific strength fibrous materials. The hope has arisen of adapting this achievement to other structural requirements by reinforcing metal matrices with high rigidity, high tensile strength reinforcements such as whiskers and metallic filaments for various temperature applications. The studies of the AGARD Materials Committee have made it possible to prepare a list of research problems which are considered to be most important for the promotion of the rapid development of composite materials for aerospace applications.

Author

N65-28865*# Poly-Scientific Div., Litton Precision Products, Inc., Blacksburg, Va.

DEVELOPMENT OF HIGHLY RELIABLE CAPSULE TYPE SLIP RING ASSEMBLIES Final Summary Report

E. W. Glossbrenner 1 Jun. 1965 616 p refs

(Contract NAS8-5091)

(NASA-CR-63882) CFSTI: HC $9.16/MF $3.00 CSCL 11D

This report summarizes the studies of design materials and processes to improve the reliability of slip ring capsule assemblies. The materials studied were contacts, structural metals, plastics, lead wire and bearings. It was found that low expansion, filled epoxy plastics supported by stainless steel members produced the best structural subassemblies. Gold ring surfaces in contact with gold-silver-nickel alloy brushes gave the best performance. Lead wire of silver plated copper conductors insulated with clear Teflon best withstood the rigors of processing and use. The processes studied included electrodeposition, matte finishing, grinding, welding, lead protection, cleaning and prevention of contamination. A design concept was evolved for strong reliable, precision capsule assemblies based upon the improved materials and processes. The designs featured precision tolerances and alignment.

Author

N65-28876*# Pratt and Whitney Aircraft, Middletown, Conn.

INVESTIGATION OF CAVITATION DAMAGE OF A MECHANICAL PUMP IMPELLER IN HIGH TEMPERATURE POTASSIUM Quarterly Progress Report No. 2, 1 Mar.–2 Jul. 1965

R. S. Kulp and J. V. Altieri 19 Jul. 1965 22 p refs

(Contract NAS3-6468)

(NASA-CR-54440; PWA-CNLM-6031) CFSTI: HC $1.00/MF $0.50 CSCL 13K

During this quarter water calibration of the RI-7B3 impeller has been completed. The results check closely with data obtained from the RI-7A3 impeller tests. Design work on the KP-1 turbopump and the Liquid Metal Pump Test Stand has been completed. Fabrication of parts for the turbopump has been completed, and the pump has been assembled. A water test of the turbopump in the Liquid Metal Pump Test Stand has been completed. Radial forces on the impeller have been determined to exist and their magnitude calculated. A two hour acrylic lacquer test run has been completed.

Author

N65-28893# California Univ., Berkeley. Lawrence Radiation Lab.

PHYSICAL CHEMISTRY OF GLASS–METAL INTERFACES

Joseph A. Pask and Marcus P. Borom 7 May 1965 36 p refs Presented at the VII Intern. Glass Congr., Brussels, 28 Jun.–3 Jul. 1965

(Contract N-7405-ENG-48)

(UCRL-11816, Rev.) CFSTI: $2.00

The phase equilibria of glass–metal heterogeneous systems are discussed. When the glass contains transition metal oxides, whose metals have a lower oxidation potential than the base metal and form alloys with the base metal, reactions occur that result in adjustments of the compositions of the alloy and the glass at the interface in a drive to achieve equilibrium. Presence of multivalent cations in the glass also assists in this drive by providing a transport mechanism for atmospheric oxidation of the base metal. It is theorized that when thermodynamic equilibrium is present in heterogeneous systems, chemical bonding can occur between the phases providing there are no complications of a physical nature. This condition corresponds to an equal attraction between the atoms at the interface leading to a balance of bond energies and a continuity of the electronic structure. Furthermore, with the development of a chemical bond the surface energy of the metal is lowered by an amount about equal to the surface energy of the molten glass.

E.E.B.

N65-28944# Pacific Missile Range, Point Mugu, Calif.
LOW-COST PLASTIC FOAM MOLDS FOR LAMINATED PLASTICS
D. M. Russell 24 May 1965 8 p
(PMR-TN-65-1; AD-615451)

Low-cost rigid plastic foam molds are used at the Pacific Missile Range for prototype of minimum-production runs of radomes, nose cones, spheres, cylinders, etc., that are to be made of glass-reinforced epoxy or polyester where the hand-layup or vacuum-bag method is used. The method used in fabricating rigid plastic foam molds in presented, but is intended as a guide only. Fabrication of rigid plastic foam molds suitable for prototype and limited production of laminated plastic objects is simple and economical. The equipment required for fabrication does not exceed that normally used in fabricating wooden or plaster molds. The plastic molds are light and are therefore easy to handle. Longer runs may be possible by using high density foam for the molds. The foam used at PMR had a density of 2 pounds per cubic foot, but it is available in densities up to 44 pounds per cubic foot. Author

N65-28948# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHOD OF PREVENTING INCORRECT INDICATIONS IN AN AUTOMATIC ULTRASONIC FLAW DETECTOR
Yu. M. Rapoport 28 Apr. 1965 4 p Transl. into ENGLISH from Russian Patent No. 154699 (Appl. No. 755822/25-8, 14 Dec. 1961) 2 p
(FTD-TT-64-1280/1; AD-615292)

The object of the invention is a method of preventing incorrect indication in an automatic ultrasonic flaw detector which is distinguished by the fact that the resonance frequencies of the converters of the neighboring channels are displaced with reference to each other. Author

N65-29083# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TECHNICAL-ECONOMIC FOUNDATIONS OF STANDARDIZATION IN MACHINE BUILDING
A. A. Kokhtev 3 Mar. 1965 619 p refs Transl. into ENGLISH of the book "Tekhniko-Ekonomicheskiye Osnovy Standartizatsii v Mashinostroyenii" Moscow Gos. Nauchn.-Tekhn. Izd. Mashinostr. Lit., 1963 p 1-431
(FTD-TT-64-669/1+2; AD-613586)

Contents: Standardization and its varieties. Development of domestic standardization in machine building. Definition of fundamental concepts and terms in standardization. Trends and principles of standardization in building of machines. Subject field, limiting features and standardization and normalization system in building of machines. Mathematical basis of standardization. Four-order standards system in building of machines. Dimensional series and parametric standards for machines and equipment. Standardization of quality requirements for machine building products. Standardization of common machine components and subassemblies. Adaption of standards and normal standards. Numerical designation systems for products of machine building and materials used. Interrelationship between standardization, specialization and automation of production in machine building. TAB

N65-29100# Naval Propellant Plant, Indian Head, Md.
INDUSTRIAL PREPAREDNESS MEASURE: STUDY OF IMPROVED METHODS OF DRYING CASTING POWDER
J. E. Geist 25 Mar. 1965 134 p refs
(AD-464534)

Four methods of drying casting powder were studied, namely "sweetie" barrel, bed drying, Roto-louvre, and dielectric. Of the methods studied, the dielectric drying offers the most advantages in regard to safety, adaptability to remote and continuous processing, drying time, and operating cost. Estimated annual savings of $178,260 may be obtained by using dielectric drying in place of the present dryhouse method. Author

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N65-29115# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON THE EMPLOYMENT OF PLASMA HEATING IN WELDING PROCESSES
K. V. Vasil'yev and A. A. Isachenko 13 Apr. 1965 22 p refs Transl. into ENGLISH from Tr. Vses. Nauchn.-Issled. Inst. Avtogen. Obrabotki Metallov (Moscow), no. 8, 1962 p 55-71
(FTD-TT-64-1140/1+2; AD-614950)

An experimental investigation was made of plasma heating in welding processes. The conclusions of the investigation are: Penetrating arcs of normal regime forming in tips with outer water cooling are energetically more appropriate than plasma streams corresponding to them in electrical power or in basic currents. The current of a penetrating arc should correspond to the diameter of the output duct of the forming tip. A current increase lowers heat distribution in the penetrating arc (above a certain limit), but is energetically indifferent for a plasma forming arc. An increase in gas consumption improves the conditions of utilizing arc energy. In the range of small consumptions the utilization of energy of plasma generating arc decreases considerably. The derived conclusions allow for a better and more rational evaluation of the propriety of using plasma heating in individual welding processes. TAB

N65-29125# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CYBERNETICS, AUTOMATION, AND TELEMECHANICS
28 Aug. 1964 557 p refs Transl. into ENGLISH of the book "Kibernetika, Avtomatika i Telemekhanika" Moscow, Izd. Akad. Nauk SSSR, 1962 p 1-356
(FTD-MT-63-191; AD-608446)

An annotated bibliography is presented on cybernetics, automation, and telemechanics. Included are literature on automatic regulation and control, the theory of relay mechanisms and finite automatic machines, computer technology, automatic checking, automated electric drive, automatic and telemechanic mechanisms, industrial electronics, instrument making, system and component reliability, economic effectiveness of automation, power engineering, mechanical engineering, machine building industry, metallurgy, mining, petroleum and gas industry, chemical industry, food industry, light manufacturing, building, agriculture, transportation, communications, commerce, public economy, scientific investigations, medicine, motion picture industry, and machine computing stations. R.N.A.

N65-29130# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DEPENDENCE OF STRESS CONCENTRATIONS ON THE QUALITY OF MACHINING DETAIL SURFACES
V. A. Pal'mov 5 Apr. 1965 14 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Otd. Tekhn. Nauk: Mekhan. i Mashinostr. (Moscow), no. 5, 1963 p 80-86
(FTD-TT-64-1080/1+2; AD-615453)

Stress concentrations on the rough surface of machine components during operation were investigated. The rough

surface is considered as a random field with known static characteristics. Methods of the random function theory are used to find the static characteristics of stresses. The coefficient of stress concentrations is also determined. The solution is obtained with the aid of asymptotic methods for sufficiently low surface roughnesses. R.N.A.

16 MASERS

Includes applications of masers and lasers. For basic research see: 26 Physics, Solid State.

N65-28154# Aeronutronic, Newport Beach, Calif. Applied Research Labs.
LASER PUMPING SOURCES Addendum to Final Technical Report
S. Byron and W. Lawrence 30 Apr. 1965 15 p ref
(Contract Nonr-4237(00); ARPA Order 306-62; Proj. Defender)
(U-3104; AD-615335)

A study on the shock tube radiation source as a laser pumping source is presented. Two side pumping configurations were fabricated and used in attempts to pump a Nd-doped glass rod and ruby rods. The successful pumping of the Nd-doped glass laser rod indicates that laser action can be produced using this pump under conditions of mechanical stress on the crystal caused by high pressure gas in contact with the plastic potting material. The electrical energy equivalent inferred from the shock pumped laser output of the Nd-doped glass laser rod indicates an equivalent chemical to electrical energy conversion efficiency of about 2%. The laser crystal was not damaged, allowing the possibility of developing repetitively pulsed chemically powered laser devices based on this concept. More difficulty was encountered in pumping ruby than was anticipated and may be due to the side pumping geometry, the low spectral intensity of the shock heated xenon source at 4100Å or mechanical stress. R.N.A.

N65-28158# Naval Research Lab., Washington, D. C. Radiometry Branch
COMPARISON OF UNDERWATER-ATTENUATION OF LASER WITH NONLASER LIGHT Final Report
G. L. Knestrick, J. A. Curcio, and A. G. Rockman 5 Jan. 1965 10 p refs
(NRL-6181; AD-610692)

In a cooperative effort with the U. S. Naval Ordnance Laboratory, the attenuation coefficients of filtered Potomac River water were measured for coherent and for noncoherent light. A He–Ne gas laser served as a source of coherent red light at 6330A, and a filtered, collimated, concentrated arc lamp furnished noncoherent light at 6355A (red) and at 5255A (green). The divergence of the light beam was of the order of one milliradian in all cases, and the entire cross section of the beam was always accepted by the receiver. The attenuation of red light was measured for underwater ranges of 6 to 36 m and of green light for ranges of 6 to 122 m. No experimentally significant difference was found between the attenuation coefficients measured for coherent and noncoherent light. The value obtained at 6328A was 0.35 m^{-1}, and at 5255A the value was 0.097 m^{-1}. Author

N65-28168# Varian Associates, Palo Alto, Calif. Central Research Lab.
COHERENT INFRARED LASER Semiannual Technical Summary Report No. 3, 17 Jun. 1964–15 Jan. 1965
M. W. Muller and A. Sher [1965] 17 p refs
(Contract Nonr-4244(00); Proj. Defender)
(Varian-314-3S; AD-610616)

The main purpose of this investigation was to determine the feasibility of a laser which operates on vibrational transitions. The population inversions among the vibrational states were to be produced by taking advantage of the Franck-Condon principle. Several schemes were proposed which make use of the Franck-Condon principle and all of them have now been eliminated as likely laser candidates in those molecular systems we have investigated. Author

N65-28497# France. Office National d'Etudes et de Recherches Aérospatiales, Chatillon-sous-Bagneux.
USE OF LASER FOR TRAJECTORY MEASUREMENT AT GREAT RANGE [UTILISATION DU LASER POUR LA TRAJECTOMETRIE A GRANDE PORTEE]
Claude Veret [1964] 17 p In FRENCH Presented at la Reunion sur les Equipements des Champs de tir CERES, 22 Sep. 1964
(ONERA-TP-166(1964))

The object of this report is to determine and experimentally verify the range of a laser telemetric device with a reflector on the tracking-object and with atmospheric perturbations being taken into account. A ruby laser emitter, focusing and collimating reflectors, telescopic receptor, and time dependent photoelectric cell to measure the range are described. For experimental data the reflector setup was removed to geographic locations from 20 to 90 kms from the sending and receiving device. It was determined that for horizontal trajectories the accuracy of the system is greatly dependent on atmospheric conditions with greater accuracy being obtained with increasing vertical trajectories. Trans. by J.G.

N65-28499# France. Office National d'Etudes et de Recherches Aérospatiales, Chatillon-sous-Bagneux.
LASER PHOTOMETRY THROUGH PHOTOELECTRIC CELL [PHOTOMETRIE DU LASER PAR CELLULE PHOTOELECTRIQUE]
Michel Philbert [1964] 13 p In FRENCH Presented at the Intern. Symp. on Laser Physics and its Applications, Bern, 12–14 Oct. 1964
(ONERA-TP-182(1964))

This report deals with the calibration of photoelectric cells which measure laser output through integration of the emission energy as a function of time. Calibration of the photoelectric receptor is described, and the construction and calibration of an attenuator which reduces the emission flux in proportion to the photoelectric cell receptivity is also presented. Both an absorptive and diffusive attenuator are described. Trans. by J.G.

N65-28545# Lockheed Aircraft Corp., Burbank, Calif.
LASER BIBLIOGRAPHY
Edward V. Ashburn Jun. 1965 66 p refs
(LR-18863)

This report consists of a bibliography of the open literature on lasers, an author index and a few notes relating to lasers. The bibliography is in four parts. A distinguishing feature of this bibliography is the classification scheme introduced in part two. The field on the study is subdivided into many topics and categories which are assigned identification numbers. These numbers are printed after each entry. In the list of categories the serial numbers of every pertinent entry appears. N.E.A.

N65-28619# New Mexico State Univ., University Park. Research Center.
VARIATION OF REFRACTIVE INDEX DURING LASER OPERATION Semiannual Report, Jul. 1964–Aug. 1965
Jerald R. Izatt, Harold A. Daw, and Robert C. Mitchell Apr. 1965 61 p refs
(Contract Nonr-3531(04))
(SATR-3; AD-615422)

High resolution measurements were made of the anomalous dispersion associated with the two Stark components of the R_1 absorption line in ruby. These measurements suggest that the R_1 dispersion obeys the Kronig-Kramers relations; however, it is superposed on a background which is itself anomalous because the refractive index increases with increasing wavelength. These measurements cover a wavelength interval of 0.5Å and the change in background index is of the order of 10^{-3} while the R_1 dispersion curve deviates from the background value by 10^{-4} at the maximum. The coherent radiation from a ruby laser used to illuminate the ruby sample, is absorbed less in traversing the sample than was expected on the basis of absorption measurements made with incoherent light. Accurate measurements were made of the temperature dependence of the ruby laser emission between 83° and 116° K and in a second interval between 196° and 207° K. Light shielding is described which was designed and tested to minimize pump light and ruby fluorescence at the detector in experiments with the sample optically pumped. R.N.A.

N65-28654# RAND Corp., Santa Monica, Calif.
NON-LINEAR ABSORPTION OF LASER RADIATION BY ATOMIC SYSTEMS
H. K. Shepard and H. T. Yura Mar. 1965 45 p refs
(Contract AF 49(638)-700)
(RM-4478-PR; AD-615262)

We consider a three-level atomic system whose energy level structure allows the absorption of two laser photons via a real intermediate state, and calculate the rates of single and double photon absorption as a function of the electric field strength E. We find that for weak fields the single and double photon absorption rates are proportional to E^2 and E^4, respectively, while for strong fields both the single and double absorption rates tend to constants independent of E (i.e., they saturate). We find situations where the ratio of the double photon absorption rate to the single photon rate is of the order 6. Also, we consider the case of two different laser beams (of different intensities and frequencies) interacting with a three-level atomic system. In particular, we calculate the rate of absorption of two photons, one from each beam. Finally, we give numerical estimates of a double photon absorption process in neutral chromium and potassium vapor. Author

N65-28671# Ling-Temco-Vought, Inc., Dallas, Tex. Military Electronics Div.
STABILIZED MASTER OSCILLATOR Final Report
G. D. Bassham Dec. 1964 142 p
(Contract FA-WA-4259)
(RD-64-115)

Two engineering models of a stabilized master oscillator system were developed. The system provides ten independent frequency sources, all referenced to the same highly stable frequency source for their basic stability. These slave outputs are capable of controlling all the vhf and uhf communications transmitters and receivers in a radio communications station on any assigned channel within its frequency range. The system uses solid state devices throughout and modular construction techniques were used to assure a reliable, flexible, and easily maintained system. The equipment was tested and found to meet all specification requirements. R.N.A.

N65-28779# Raytheon Co., Waltham, Mass. Research Div.
GASEOUS LASER RESEARCH Interim Engineering Report No. 1, 1 May–31 Jul. 1964
F. Horrigan, S. Koozekanani, and R. Tetaronis Wright-Patterson AFB, Ohio. Systems Eng. Group [1964] 57 p refs
(Contract AF 33(615)-1949)
(S-669; AD-613688)

The objective of this research effort is to achieve detailed understanding of the excitation mechanisms operative in the xenon and helium–xenon gas lasers. The method of measurement to be used in obtaining the cross sections for electron impact excitation of the various xenon levels of interest is described. A description of the first test vehicle constructed and the results of its tests are given. The experimental results are given. On the theoretical side, estimates of xenon lifetimes have been obtained by means of the Bates-Damgaard approximation. An application of the rate equation and various simple assumptions have been applied to the xenon system, resulting in expressions for laser power and population inversion as functions of electron density for one special case. The theory of a diffusion-controlled glow discharge has been modified to include the effects of the metastables found in all the rare gases. Author

N65-28795# Library of Congress, Washington, D. C. Aerospace Technology Div.
SOVIET LASER BIBLIOGRAPHY: ANALYTICAL SURVEY Surveys of Soviet-Bloc Scientific and Technical Literature
6 May 1965 59 p refs
(ATD-P-65-23)

A bibliography on Soviet laser research and associated fields, covering the period from January 1961 to September 1964, is presented. Twenty-seven participant facilities were involved in the reports covered, with the majority of the material distributed among eight key institutions. These are discussed in the descending order of contributions. Interfacility correlation among these eight key institutions is described, and a brief discussion of the leading scientists associated with the aforementioned institutions is included. A bibliography of the retrieved articles is divided into such subsections as gaseous lasers; lasers based on paramagnetic materials and on semiconductor materials; exotic lasers; spectroscopy of paramagnetic laser materials; and laser theory, applications, and effects. M.R.W.

N65-28901# Weapons Research Establishment (Australia).
A STUDY OF THE HIGH GAIN 2.026 MICRON XENON–HELIUM LASER
B. A. See Apr. 1965 35 p refs
(PAD-104)

High gain lasers are of particular interest in the field of communications due to the relative ease with which they may be constructed and run. This paper presents the results of studying the 2.026 micron Xenon–Helium laser. The parameters of the Xe–He laser have been studied with the view to optimizing the power output. In particular the optimum ratio of partial pressures, the total pressure and the transmission of the mirrors have been investigated. The paper concludes with an examination of the effect of tube diameter on small signal gain. Author

N65-28920# Naval Research Lab., Washington, D. C.
LASER RESEARCH Interim Progress Report, 30 Jun. 1964–1 Jan. 1965
J. W. Tucker, J. N. Bradford, and R. C. Eckhardt Apr. 1965 22 p refs
(ARPA Order 306-62)
(NRL-MR-1604; AD-615450)

This report reviews recent laser work of the Optics Division, Naval Research Laboratory. The major topics covered include the effect of pumping on ruby quality, optical examination of lanthanum fluoride, testing of large ruby laser rods, dc operation of the AH6 mercury tube, hologram experiments, fast Q-switching, and magnetic Q-spoiling experiments.
Author

N65-28961*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LASER WELDING
R. J. Schwinghammer 23 Jun. 1965 51 p refs
(NASA-TM-X-53285) CFSTI: HC $3.00/MF $0.50 CSCL 20E

A comprehensive analysis of the current state of the art in high powered lasers and laser welding is presented. Among the pertinent subjects discussed are basic laser types and the MSFC 240 kilojoule system including the gun, focussing system, power supply, pulse forming network and diagnostics. Welding aspects are considered in detail and "Q" spoiling techniques, pulse repetition rate and pulse width effects are explored. The future of continuous wave lasers for welding is discussed, and pertinent general laser information is given in the appendix.
Author

N65-28963# PEK Labs., Inc., Sunnyvale, Calif.
LASER FLASH LAMP Final Report
G. O. Harding [1964] 28 p refs
(Contract Nonr-4122(00); Proj. Defender)
(AD-615384)

A method has been described for measuring the absorption coefficient of a gas carrying discharge current typical of flash lamps. The absorption was obtained by comparing the radiation in two different directions from the same flash lamp, and hence, required no second flash lamp. The plasma was assumed to be uniform; Stefan's law involving the fourth power of temperature helps make this seem a reasonable approximation. In choosing a tube size, the internal dimension should be approximately the reciprocal of the expected value of α for achieving the smallest probable error. The method may be of use for investigating plasmas of different origins and fields of application.
Author

17 MATERIALS, METALLIC

Includes cermets; corrosion; physical and mechanical properties of materials; metallurgy; and applications as structural materials. For basic research see: 06 Chemistry. For related information see also: 18 Materials, Nonmetallic; and 32 Structural Mechanics.

N65-28111# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
COMBINING HIGH-TEMPERATURE-PLASTIC DEFORMATION WITH HARDENING
M. G. Lozinskiy, V. D. Sadovskiy, and Ye. N. Sokolkov 29 Jan. 1965 17 p refs Transl. into ENGLISH from Soveshchaniye po Novym Protessam Obrabotki Metal. Bavleniyem v Mashinostro., Akad. Nauk SSSR, 1962 p 85–93
(FTD-TT-64-806/1+2; AD-610793)

Thermomechanical treatment, based on the process of high-temperature plastic deformation with quenching, is discussed. Austenization, overcooling of austenite, deformation, hardening into martensite, and low annealing are considered.
E.E.B.

N65-28112# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CHROME-NIOBIUM-TITANIUM SYSTEM
V. N. Svechnikov, Yu. A. Kocherzhinskiy et al 21 Jan. 1965 7 p refs Transl. into ENGLISH from Sb. Nauchnykh Rabot, Voprosy Fiz. Met. i Metalloved. (USSR), no. 16, 1962 p 128–131
(FTD-TT-64-810/1+2; AD-610764)

An investigation of the triple chrome-niobium-titanium system is investigated. The materials for the preparation of the alloys were: (1) electrolytic refined chromium with the following content admixtures: 0.0022% Oxygen, 0.008% N, 0.004% Si; (2) niobium in bars with Nb content of about 99.5%; and (3) iodide titanium. To explain the position of the boundaries of phase areas all alloys were subjected to annealing at 1250° C for a period of 75 hours. Niobium rich alloys were held at this temperature for 150 hrs. with subsequent hardening. On samples, which underwent such a treatment, micro and X-ray structural investigations were made. On the basis of investigation results were determined and the boundaries of phase areas, existing in the Cr-Nb-Ti system at 1250° C. The fusibility diagram of the $Cr\text{-}NbCr_2\text{-}TiCr_2$ system formulated according to data of differential thermal analysis is presented. N.E.A.

N65-28125# Bureau of Mines, Reno, Nev. Metallurgy Research Center.
PROPERTIES OF VANADIUM–CARBON ALLOYS
D. R. Mathews and E. A. Rowe 1965 19 p refs
(RI-6628)

The solubility of carbon in electrorefined vanadium was determined to be approximately 0.27 wt pct at the eutectic temperature 1,650° C and 0.03 wt pct at 700° C. The tensile strength and hardness of vanadium increased with carbon content to the solubility limit, but this effect was small, probably because of the narrow solubility range. Between the solubility limit and 0.3 weight-percent carbon, the second phase had essentially no strengthening effect in vanadium. The second phase, observed metallographically at the grain boundaries and within the grains, was shown by autoradiography to contain high-carbon concentrations. This second phase was identified as V_2C by X-ray analysis. Unhomogenized (as-melted) ingots containing more than 0.4 wt pct carbon, cracked extensively during cold rolling; however, ingots with a calculated 6.6 wt pct V_2C equivalent to 0.75 wt pct carbon were successfully worked at 900° C. The average coefficient of thermal expansion increased slightly with increased carbon content up to the solubility limit and then remained constant for higher carbon contents. The room temperature electrical resistivity of vanadium did not vary with carbon content within the composition range studied.
Author

N65-28201*# Southern Research Inst., Birmingham, Ala.
EFFECT OF PROTECTIVE COATINGS ON THE STRESS-CORROSION PROPERTIES OF SUPERSONIC-TRANSPORT SKIN MATERIALS Tenth Quarterly Status Report, 1 Mar.–31 May 1963
J. O. Honeycutt and A. C. Willhelm 15 June 1965 27 p refs
(Contract NASr-117)
(NASA-CR-63784) CSCL 11F

Steel, superalloy, and titanium alloy substrates, coated with aluminum-modified silicone, catalytically cured silicone, zinc in silicate vehicle, electrophoretically deposited aluminum, and flame-sprayed aluminum, were visually examined after undergoing exposures to dry 550° and humid 95° F atmospheres for 1000 hours. Four exposure conditions were used for each substrate coating combination: undamaged with no salt, and with salt; and damaged with no salt, and with salt. The speci-

mens were then subjected to compressive loading for bend-ductility evaluations, with compression continued until fracture occurred, or complete compression was attained. The inherent ductility of a substrate was determined by measuring the shortening that occurred during compression of a bare, unexposed specimen. Results, which showed wide variation for the several specimens, are presented in tabular form and interpreted graphically. M.G.J

N65-28204# Pennsylvania Univ., Philadelphia. Lab. for Research on the Structure of Matter.
MICROYIELDING IN IRON AT LOW TEMPERATURES
Ram Kossowsky (Curtiss-Wright Corp.) and Norman Brown (Ph.D. Thesis) 30 Mar. 1965 39 p refs
(Contract Nonr-551(20))
(AD-615757)

The micro and macro yielding of zone refined polycrystalline iron was investigated between 298 and 5° K. The elastic limit became temperature sensitive below 50° K so that its value at 0° K was about twice its 5×10^3 psi tensile value at 298° K. The stress to produce a permanent strain of about 10^{-6} was more temperature sensitive with an increase of $8\text{-}14 \times 10^3$ psi between 298° and 0° K. The stress for macro yielding increased about 120,000 psi between 298° and 0° K. The results have been interpreted in terms of three Peierls-Nabarro forces, one for existing kinks another for the motion of screw dislocations on a constant slip plane, and the third for motion onto another slip plane. Impurities play a role with the Peierls-Nabarro force in determining the microyield points. The large 120,000 psi increase in macroyield point between 298 and 0° K is attributed to the P-N-F for cross-slip which causes a high internal stress-field to be built up prior to macro-yielding. Author

N65-28217# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
THE BETA-ALPHA AND ALPHA-BETA TRANSFORMATIONS IN PLUTONIUM UNDER APPLIED STRESSES
R. D. Nelson, T. K. Bierlein, and F. E. Bowman Jan. 1965 35 p refs
(Contract AT(45-1)-1830)
(BNWL-33)

Research was performed on the effect of concurrent applied stress on the beta-alpha and alpha-beta transformations in plutonium. Total strain during beta-alpha transformation under compression is almost completely independent of the transformation rate. Applied compressive stresses above 9000 psi cause all of the beta-alpha transformation strain to occur as a contraction parallel to the applied stress. Applied stresses of 4000 psi cause all the strain during the beta-alpha transformation to occur as a contraction perpendicular to the applied stress. Applied stresses during beta-alpha transformation produce a microstructural shape texture and a crystallographic texture. The anisotropic strains accompanying the alpha-beta transformation under uniaxial stress indicate that a texture also develops. The alpha-beta and beta-alpha transformations in textured plutonium result in anisotropic transformation strain in the absence of applied stress. Some phase transformation excess creep occurs during the transformations in specimens subjected to an external stress. R.N.A.

N65-28324# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RESEARCHING DAMPING CHARACTERISTICS OF SOME ALLOYS AT LOW TEMPERATURES
A. P. Yakovlev 16 Apr. 1965 11 p ref Transl. into ENGLISH from Byul. Inst. Metallokeramiki i Spets. Splavov, Acad. Nauk Ukr. SSR, 1963 p 199–204
(FTD-TT-64-1157/1+2; AD-615223)

An investigation was made of the damping characteristics of the aluminum alloys D16 and AMg-6T and also the titanium alloy VT-1D. The logarithmic decrement of damping of the alloys is presented graphically for temperatures −196C and above. Author

N65-28351# Frankford Arsenal, Philadelphia, Pa. Pitman-Dunn Research Labs.
STRESS-CORROSION TESTS ON COMMERCIAL AND HIGH PURITY GRADE 7075-T6 ALUMINUM ALLOY
Helen R. Pritchard May 1965 14 p refs
(M65-17-1; AD-615566)

Alternate immersion stress-corrosion tests were conducted on commercial and high purity 7075-T6 aluminum alloy stressed in the short transverse direction at levels of 8000 psi to yield strength. No failures occurred in the commercial grade at stress levels of 20,000 psi or less. In the high purity grade, the highest stress which did not produce failures was 10,000 psi. At levels of 30,000 psi or less, the commercial grade specimens had a life of three or more times that of the high purity specimens. Author

N65-28354*# General Electric Co., Cincinnati, Ohio. Space Power and Propulsion Section.
MATERIALS FOR POTASSIUM LUBRICATED JOURNAL BEARINGS Quarterly Progress Report No. 7, 22 Oct. 1964–22 Jan. 1965
R. G. Frank, ed. [1965] 139 p refs
(Contract NAS3-2534)
(NASA-CR-54345) CFSTI: HC $4.00/MF $1.00 CSCL 11F

Approximately 25 pounds of potassium were purified by hot trapping for 24 hours at 1200° to 1350° F in a titanium-lined zirconium-gettered hot trap after being purified by vacuum distillation. The vacuum distillation facility for the cleaning of the tested corrosion specimens was completed. Cb–1Zr alloy corrosion capsules were measured dimensionally and weighed. Lucalox and Zircoa 1027 exhibited the largest change in dimensions. To evaluate dimensional stability, duplicate specimens of candidate materials were tested at 800°, 1200°, and 1600° F. Zircoa 1027 showed a change of +0.03% at 800° F and the Star J alloy showed a change of +0.06% at 1600° F. The mean coefficient of thermal expansion was determined as a function of temperature from room temperature to 1600° F for K601, TiC TiC+10%Cb, TiC+10%Mo, TiC+5%W, TiB_2, and Star J. Excellent agreement of the data was observed between duplicate specimens and between heating and cooling cycles of the same material. The compression load train was checked out successfully at room temperature with Mo–TZM alloy specimens and the compressive 0.2% yield strength was 113 300 psi. R.N.A.

N65-28361# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EFFECT OF PRELIMINARY PLASTIC DEFORMATION ON THE BRITTLENESS OF STEEL AT 4.2° K
O. V. Klyavin and B. I. Smirnov 26 Apr. 1965 9 p refs Transl. into ENGLISH from Fiz. Metal. i Metalloved. (USSR), v. 6, no. 1, 1963 p 134–135
(FTD-TT-64-1237/1+2; AD-615238)

The brittle strength of both deformed (stretched and compressed) and roasted steel specimens was determined in tests in elongation at a temperature of 4.2° K (liquid helium). At 4.2° K all the specimens break down through brittleness, however, with

different stresses. The values are given in tabulated form. It is seen that the preliminary deformation by stretching improves the brittle strength, and the compression lowers it. Explanations of the results obtained from the tests are presented.
N.E.A.

N65-28412 Max-Planck-Institut für Physik und Astrophysik, Munich (West Germany).
DEVICE FOR MEASUREMENTS OF MULTIPLE SCATTERING AND OF TRACK CURVATURES IN NUCLEAR EMULSIONS
M. Bott-Bodenhausen *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 5 p (See N65-28375 17-24)

The operation of an electric transistorized device used to measure multiple scattering and track curvature in nuclear emulsions is described. The discriminator, calculating circle, transfer circuit, and subtraction circuit components of the device are shown in block diagrams. The instrument is connected to and used in conjunction with a microscope. L.S.

N65-28602# Bendix Corp., South Bend, Ind. Bendix Products Aerospace Div.
DEVELOPMENT OF IMPROVED STRENGTH AND OXIDATION RESISTANCE IN CHROMIUM COMPOSITES Final Report, 17 Mar. 1964–16 Mar. 1965
Wayne A. Farrington and Robert V. Watkins Apr. 1965 123 p (Contract NOw-64-0321-c)
(AD-466787)

Efforts directed toward improvement of the atmospheric contamination resistance and high temperature strength of a ductile chromium composite material are described. Numerous results of high temperature continuous weight gain determinations and strength tests are presented. Improvements in the high temperature weight gain resistance, oxide scale adherence, and resistance to nitridation were attained through compositional variations. Minor additions of calcia or silica or a larger addition of magnesio-aluminate spinel to a basic chromium-3 weight percent magnesia composition were shown to improve resistance to contamination without large ductility penalties. Substantial increases in high temperature strength were associated with alloying additions including tantalum, niobium, and molybdenum, but these elements caused a loss of ductility at room temperature. The use of manganese as an alloying element produced a material with superior low temperature ductility at room temperature. The use of manganese as an alloying element produced a material with superior low temperature ductility and slightly higher elevated temperature strength.
Author

N65-28635*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
FATIGUE OF FOUR STAINLESS STEELS AND THREE TITANIUM ALLOYS BEFORE AND AFTER EXPOSURE TO 550°F (561°K) UP TO 8800 HOURS
Walter Illg and Claude B. Castle Washington, NASA, Jul. 1965 58 p refs
(NASA-TN-D-2899) CFSTI: HC $3.00/MF $0.50 CSCL 11F

Fatigue and tensile sheet specimens of four steels and three titanium alloys were tested before and after exposure to 550° F (561° K) for periods up to 1 year. None of the seven materials exhibited a serious degradation in fatigue life in any of the four specimen configurations used. However, in two cases (Ti-4Al-3Mo-1V spot-welded, Ti-8Al-1Mo-1V edge-notched), a slight but steady life-reduction trend was observed. The static joint efficiencies, prior to exposure, of both spot-welded and fusion-welded specimens were higher for titanium alloys than for steels.
Author

N65-28643# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HIGH-ALUMINA POROUS CERAMICS WITH HIGH GAS PENETRABILITY
V. D. Tsigler and B. Ye. Pindrik 19 Apr. 1965 10 p refs Transl. into ENGLISH from Steklo i Keram. (Moscow), no. 1, 1964 p 22–26
(FTD-TT-64-1171/1+2; AD-615227)

Methods of improving the gas penetrability of high-alumina porous ceramics through use of burn-out additives were studied. Ordinary and finely fractioned grain compositions of 1.5 mm down to 0.5 mm were added to specimens of varying porosities, and use of a sealing coating made it possible to determine gas penetrability on the same samples at room temperature and at heats up to 900°. In general, gas penetrability of the porous specimens in greater when coke of finely fractional composition is added, than with an additive of ordinary grind; when compared with room temperature, permeability at 500° goes down by a factor of 3 to 3.5, and at 900° by a factor of 7 to 9. M.G.J

N65-28645# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATION OF THE RESISTANCE TO PLASTIC DEFORMATION ON THE PART OF CHROMIUM WITH MOLYBDENUM BY THE METHOD OF HOT HARDNESS
D. A. Prokoshkin, M. P. Matveyeva, and V. A. Morozov 29 Apr. 1965 8 p refs Transl. into ENGLISH from Issled. po Zharoproch. Splavam, Akad. Nauk SSSR, Inst. Met. (Moscow), v. 7, 1961 p 210–213
(FTD-TT-64-1297/1+2; AD-615256)

The results of research by the method of hot hardness of the resistance to plastic deformation of a number of alloys of the Cr-Mo system are presented. The alloys were prepared from electrolytic chromium to the purity of 99.96% with a content of 0.014% N_2, 0.01% O_2, and electrolytic molybdenum of the purity of 99.85%. The hot hardness was measured on cylindrical specimens of 14.8 mm diameter and 5.0 mm thickness. As a characteristic of the resistance to plastic deformation there was taken the rate of creep calculated in accordance with the date of the measurements of the duration hot hardness and referred to the identical dimension of the impression of the indenter for the different alloys. The results of the measurements are shown. N.E.A.

N65-28675# Brigham Young Univ., Provo, Utah. Dept. of Physics
DIFFUSION IN METALS AT ULTRA-HIGH PRESSURES Final Report
O. L. Decker and H. B. Van Fleet 1 Mar. 1965 57 p refs (Grant AF-AFOSR-201-63)
(AFOSR-65-0580; AD-614839)

Silver wires 3 mil in diameter have been quenched from temperatures between 500 and 1000° C to room temperatures for pressures up to 30 kbar. Upon quenching, an increase in room temperature resistance was measured, but 90% of this increase was permanent and remained even after high temperature anneals. The diffusion of silver into lead has been investigated using radioactive tracer techniques in a temperature range within 200° C of the melting point of lead for six pressures between zero and 40 kbar. The diffusion process for silver into lead changes from a composite of interstitial plus vacancy to an interstitial mechanism. Therefore the measured activation volume of .38 ±.03 atomic volumes as measured for pressures above 11.9 kbar is ΔV_m the activation volume of motion which characterizes the interstitial mechanism.
Author

N65-28687# Illinois Univ., Urbana. Materials Research Lab.
ANNUAL TECHNICAL REPORT, 1964–1965
May 1965 104 p refs

Materials research is presented on condensed state of matter theory; structural changes in simple glass systems during crystalline phase nucleation; excited states of defects, color centers, and electronic properties of ionic crystals; nuclear analytic methods; vibration–rotation spectroscopy of molecules trapped in rare gas lattices; superconductivity; junction in compound semiconductors; low temperature thermal conductivity; mass spectrograph facility; magneto-circular dichroism; solid state electronics; paramagnetic relaxation and dynamic nuclear polarization; dielectric and structural investigation of complex compounds of the Perovskite type ABO_3, enthalpy changes in athermal solid state transformations; electronic specific heat of transition element alloys; point defect; very high pressure for investigating the structure of matter; conduction mechanisms in semiconducting glasses; mechanical and surface behavior of solids; radiation damage, anharmonic effects, defects, and transformations in solids; dislocations and surface barriers; diffusionless phase changes; annealing of cold worked metals; properties of noble gas crystals; and electron and nuclear magnetic resonance. R.N.A.

N65-28784# Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
CORRELATION OF OPTICAL AND ELECTRON-OPTICAL OBSERVATIONS IN TORSION FATIGUE OF BRASS
J. C. Grosskreutz, W. H. Reimann, and W. A. Wood Apr. 1965 33 p refs
(Contract Nonr-266(91))
(TR-19; AD-465538)

Optical micrographs of etched sections of torsion fatigued brass are compared with transmission electron micrographs of foils prepared from specimens cycled under comparable conditions. The dispersed slip characteristic of the S range (±1°) is found to correspond to a reasonably uniform dislocation density of $9 \times 10^8/cm^2$ which consists mostly of isolated screw dislocations. Distortion and fatigue zones which etch up on samples cycled in the F range (±3°) are found to correspond to slip planes which contain a high density of dislocation loops, fragments, and unresolved debris. During thinning of the foils, the electropolishing solution often attacks and perforates thin regions preferentially. The cell structure which has been observed on samples cycled in the H-range (±25°) is also seen directly in transmission. Author

N65-28785# Drexel Inst. of Tech., Philadelphia, Pa. Dept. of Metallurgical Engineering.
FRACTURE OF METALS DURING DEFORMATION PROCESSING UNDER CONDITIONS OF HOT WORKING Progress Report, Apr. 12–Jun. 12, 1965
J. V. Mullin and G. E. Dieter 15 Jun. 1965 9 p refs
(Contract NOw-65-102-d)
(PR-4; AD-466493)

A study of the ductile fracture of metals under conditions of stress, temperature, and strain rate that are representative of hot working deformation processing operations is presented. The hot metal will be tested under combined stress conditions of torsion and axial loading. By variation of the normal and shear stresses on the plane of failure a study will be made of the stress criterion for hot ductile fracture. Using criteria developed under this phase of study, emphasis will be placed on the effects of metallurgical variables on hot fracture. A brief discussion is given on some of the tests that are now in progress. N.E.A.

N65-28908# Aeronautical Research Labs., Melbourne (Australia).
THE EFFECT OF STRAIN ON THE RESISTANCE OF METALS AND ALLOYS
J. G. Scott Feb. 1964 22 p refs
(ARL/SM-291)

To elucidate the behavior of the resistance strain gage, the test methods of a number of investigators were examined to obtain values for gage factor for various materials. In attempting to assign values to the materials only a rough quantitative approximation was possible. Experimental errors are insufficient to account for the scatter in values for the same materials. Possible causes for this scatter are discussed but no explanation is found. R.N.A.

N65-28926# Atomic Energy of Canada Ltd., Chalk River, Ontario.
THE PROPERTIES OF COLD-WORKED ZIRCONIUM-2.5 WT % NIOBIUM FUEL SHEATHING: PART I
K. P. Steward Mar. 1965 37 p refs
(AECL-2250) Available from Atomic Energy of Canada, Ltd., Chalk River: $1.00

The properties of two batches of cold-worked zirconium-2.5% niobium fuel sheathing have been investigated. Both axial and ring tensile tests show similar trends to those observed in Zircaloy-2, strain-age hardening being evident between 250° C and 400° C, and minimum ductility at about 350° C. Burst strength above 400° C is less affected by temperature than axial or ring tensile strength, whilst minimum circumferential ductility occurs at 450° C. Hardness tests indicate recovery at 450° and 500° C, but not at 400° C; slight hardening is apparent after short times at 350° C. The recovery curves suggest two processes occurring simultaneously, namely, relaxation of cold work, and ageing due to rejection of βNb from supersaturated solid solution. The usual duplex texture for tube-reduced zirconium alloy tubing is observed, and residual stresses are low. The hydride orientation numbers are batch 1 fn = 0.12 and batch 2 fn = 0.18, whilst the thresholds for stress-reorientation of hydrides are about 9000 psi and 10,000 psi for batches 1 and 2, respectively. Author

N65-28932# Battelle Memorial Inst., Columbus, Ohio. Defense Metals Information Center.
MECHANICAL PROPERTIES OF METALS—REVIEW OF RECENT DEVELOPMENTS
J. E. Campbell 20 Jul. 1965 6 p refs

Recent developments in procedures for evaluating the mechanical properties of metals are reviewed. Included are reports on low-temperature properties of titanium alloys, fracture testing of steels, effects of exposure and stress corrosion on various alloys, effect of strain rate on tubular steel, and effect of vacuum on properties of single crystal and polycrystalline specimens of aluminum. M.R.W.

N65-28940# Royal Aircraft Establishment, Farnborough (England).
METASTABLE PHASES IN ALLOYS OF TITANIUM AND TRANSITIONAL ELEMENTS [METASTABIL'NYE FAZY V SPLAVAKH TITANA S PEREKHODNYMI ELEMENTAMI]
Yu. A. Bagaryatskii, T. V. Tagunova, and G. I. Nosova Oct. 1964 32 p refs Transl. into ENGLISH from Probl. Metalloved. i Fiz. Metal. (Moscow), 1958 p 210–234
(RAE-LIB-TRANS-1080)

Four metastable phases are considered to exist in titanium alloy systems containing a second transition metal:- (1) At high alloy concentrations the β-phase can be retained by

quenching and this phase has anomalous properties including a negative coefficient of resistance. (2) At low alloy concentrations a martensitic phase (α') forms, on quenching from the β-phase region, which is based on the low temperature allotrope of titanium. (3) In titanium–tungsten alloys an orthorhombic martensite (α'') results from quenching alloys of intermediate alloy content. (4) The ω-phase may be regarded as a low temperature modification of the β-phase and can be produced without diffusion either by quenching alloys slightly below the limit for β retention or by plastically deforming metastable β. This ω can be regarded as a special martensitic phase in which surface relief effects are absent. ω can also result from diffusion processes occurring during the tempering of metastable β-phases. Author

N65-28969# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON DEFECTS IN CRYSTALLINE LATTICE ORIGINATING DURING THE PROCESS OF HARDENING OF SILVER HEATED IN AIR

T. D. Ositins'ka, V. O. Pervakov, and V. G. Khotkevich 21 Apr. 1965 8 p refs Transl. into ENGLISH from Ukr. Fiz. Zh. (Kiev), v. 8, no. 8, 1963 p 921-924
(FTD-TT-64-1211/1+2; AD-615237)

A series of measurements were made to evaluate the contributions caused by vacancy type defects and the increment in electrical resistance during the hardening of silver by heating in air. And also to select the annealing condition, which allows the removal of the basic mass of these defects from the metal leaving in it mostly the dissolved oxygen. The obtained data offers also certain additional information about the mobility of oxygen atoms at temperature close to room temperature. TAB TAB

N65-28981# Battelle Memorial Inst., Columbus, Ohio. Defense Metals Information Center.

COLUMBIUM, TANTALUM, AND MOLYBDENUM Review of Recent Developments

E. S. Bartlett, F. F. Schmidt, and J. A. Houck 2 Jul. 1965 4 p ref

Recent developments in niobium, tantalum, and molybdenum technology are reviewed. Among the specific items covered are the results of bend-tests on the ductile–brittle transition temperature of butt-welded 0.035-inch thick sheet material. It was shown that welding markedly increases the transition temperature of niobium alloys. By comparison, tantalum alloys retain good ductility to low temperatures. Butt welds in 3/8-inch thick plates were bent at room temperature. Also, a study was completed to determine the effect of thermal–mechanical behavior of Mo–25W–0.1Zr alloy. This alloy showed unusual response to mechanical working. Extruded specimens were rolled in the 1600° to 2800° F range, and an increase in hardness with increasing rolling temperature was observed. Success was also reported in producing TZM alloy forgings by high-energy-rate forging. Configurations produced were a rocket nozzle insert and a thin-webbed circular section using a three-stage forging procedure. E.E.B.

N65-29016# Aeronautical Research Labs., Melbourne, (Australia). Dept. of Supply.

CREEP TESTING OF CHROMIUM-BASE ALLOYS

H. T. Greenaway Oct. 1964 28 p refs
(ARL/MET-55)

High temperature creep testing has been carried out on a wide range of binary and more complex chromium-base alloys, using either compression or tension loading. In general, the earlier "sorting" tests were done in compression machines, whilst later results have been on the tension testing of either large or small specimens. Creep values obtained by the two methods—tension and compression—have, where comparable, been similar except in one case where extraneous factors produced marked differences in the results. The range of alloys investigated includes those relying on solid solution strengthening and/or dispersion hardening for their creep strength, and the results obtained have shown that some chromium-base alloys have excellent creep properties above 1000° C. These properties are considerably better than those of the best present day commercial high temperature alloys, and show the potentialities of chromium-base alloys for such applications as rotor blading for the gas turbine aero engine. Author

N65-29039# Joint Publications Research Service, Washington, D. C.

STUDIES IN STRUCTURE OF TUNGSTEN AND MOLTEN IRON, COBALT, AND NICKEL BORIDES

23 Jul. 1965 13 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), no. 1, 1965
(JPRS-31225; TT-65-31722) CFSTI: $1.00

The structure of tungsten single crystals was investigated in order to study the impurity phases, their distribution, and the effect on the fine structure. A combination of transmission electron microscopy and electron diffraction was used in this investigation. Also, the surface tension and density of the melts iron–boron, cobalt–boron, and nickel–boron were examined. The strong chemical reaction between the components of these melts was confirmed by the presence of the characteristic points on the surface tension isotherms. Further, a comparison of the surface tension isotherms with the corresponding phase diagrams indicated the absence of a marked dissociation of the compounds FeB and Ni_3B_2 during the melting. Since the presence of the Co_3B_2 compound in solid state was not confirmed it was assumed that the characteristic point corresponding to it on the surface tension isotherm is the result of the dissociation of the CoB compound. An analogous phenomenon was observed during the investigation of the surface tension of melts of the system nickel–beryllium. E.E.B.

N65-29046# Utah Univ., Salt Lake City. Dept. of Metallurgy.

INVESTIGATION OF THE RECRYSTALLIZATION BEHAVIOR OF DILUTE ALLOYS OF MAGNESIUM AND CHROMIUM Technical Report No. 1

Charles H. Pitt, Ernest L. Moore, Charles R. Brinkman, and Theron G. Odekirk Dec. 1964 73 p refs
(Grant AF-AFOSR-39-63)
(AFOSR-65-0755; AD-615620)

An investigation into the recrystallization behavior of pure Magnesium and some of its dilute binary alloys and pure chromium has been made. Techniques for preparing thin foils of magnesium suitable for examination in the electron microscope have been developed and photographs taken of dislocations, nucleation of dislocations and migrating grain boundaries. An x-ray technique was developed to measure the degree of recrystallization of magnesium and it was found that surface recrystallization played an important part in the recrystallization process. Activation energies determined for surface recrystallization in magnesium and its alloys range from 28 to 31 kilocalories per mole while that for bulk recrystallization was 20 kilocalories per mole. Determination of the percent recrystallization in pure chromium was done by a microscopic technique. The activation energy for the recrystallization of pure chromium (99.997%) was found to be 76 kilocalories per mole. Author

N65-29051 Purdue Univ., Lafayette, Ind. Thermophysical Properties Research Center.
DATA BOOK. VOLUME I: METALLIC ELEMENTS AND THEIR ALLOYS
K. H. Chu et al Jun. 1965 178 p Supplement
(Contract AF33(613)-2281)

Tabulated data are presented on the thermal conductivity, viscosity, thermal radiative properties, and thermal diffusivity of metallic elements and alloys in their solid, liquid, and gaseous states. R.N.A.

N65-29052# Pechiney Co., Chambéry (France).
BASIC RESEARCH ON THE REFRACTORY METALS MOLYBDENUM, NIOBIUM, TANTALUM AND TUNGSTEN [RECHERCHES DE BASE SUR LES METAUX REFRACTAIRES MOLYBDENE, NIOBIUM, TANTALE ET TUNGSTENE]
R. Syre Paris, AGARD, Jun. 1964 39 p refs In ENGLISH and FRENCH Sponsored by AGARD
(AGARD-482)

This report has been compiled for the AGARD Structures and Materials Panel in the light of information received from N.A.T.O. nations on the research and development of the four refractory metals, niobium, tantalum, tungsten and molybdenum. It shows, for each of the four metals, the fields in which further basic research seems most urgently needed and suggests a basis for a technical co-operative research program. The five most profitable lines of research are considered—equilibrium diagrams, diffusion couples, effects of impurities, reactions with gases and protective coatings. Author

N65-29073# IIT Research Inst., Chicago, Ill. Technology Center.
EMBRITTLEMENT OF METALS BY ORGANIC LIQUIDS Summary Report, Dec. 1, 1962–Nov. 30, 1963
W. Rostoker 2 Jan. 1964 42 p refs
(Contract DA-11-ORD-022-3108)
(IITRI-B183B2-4; AD-426964)

High-strength steel and aluminum are shown to be embrittled in notched fatigue testing in the presence of water, alcohols, glycols, ethers, and aldehydes. It is shown that longer carbon chains, branching molecular shapes, and closed rings reduce the degree of embrittlement while multiplicity of (—OH) or (—O—) groups enhance it. By a variety of experiments and deductions, water is shown to behave more like a zero chain length organic molecule rather than an electrolytic medium. Author

N65-29096# Air Force Systems Command, Wright-Patterson AFB, Ohio.
STRENGTH OF THIN METAL FIBERS
V. N. Geminov and I. M. Kop'yev 7 May 1965 12 p refs Transl. into ENGLISH from Tr. Inst. Met. Akad. Nauk SSSR (Moscow), no. 10, 1962 p 202–208
(FTD-TT-65-14/1+2; AD-615875)

The problems of the strength of thin metal monocrystals-barbs are discussed. The strength of barbs with a diameter of more than 20 to 30$_\mu$, coincides with the strength of massive samples but, with a diameter of 10 to 15$_\mu$, a sharp rise in strength within certain limits approaches the theoretical strength of the metal. Such an effect is characteristic for thin films but at a lesser thickness. High strength metal barbs and films have a monocrystal structure. The destruction of barbs is preceded by plastic deformation and is connected with displacement processes. The strength of barbs depends on the quality of their surfaces, and those with mirror-like surfaces have high yield and ultimate strength but those with defective surfaces have mechanical properties close to the massive samples. R.W.H.

N65-29097# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ROENTGENOGRAPHIC AND FRACTOGRAPHIC INVESTIGATION OF STEEL DESTRUCTION
V. M. Finkel, P. I. Krotenok, and A. M. Savel'yev 7 May 1965 12 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Chern. Met. (Moscow), no. 6, 1963 p 130–137
(FTD-TT-65-19/1+2; AD-615876)

The purpose of this investigation was to study fracture of steel in a flat widely converging microbundle at various temperatures from +20 to —180° C by interference fractography and roentgenography. TAB

N65-29112# Aluminum Co. of America, New Kensington, Pa. Chemical Metallurgy Div.
INVESTIGATION OF THE MECHANISM OF STRESS CORROSION OF ALUMINUM ALLOYS Final Report, Dec. 6, 1963–Feb. 6, 1965
G. C. English [1965] 105 p refs
(Contract NOw-64-0170-c)
(AD-615789)

The cathodic protection of 7075 alloy in a corrosive, acid chloride solution was investigated. Subsize tensile specimens for protection were taken in the short-transverse direction from 2-inch thick plate in two tempers, one (-T6) susceptible to stress corrosion and one (-T73) not susceptible to this type of corrosion. In the solution used a susceptible specimen stressed to 75% of its yield strength failed by stress corrosion in an hour while a stresses nonsuceptible specimen failed by general corrosion within two days. At a potential 0.57 volts negative to the free corrosion potential, a stressed susceptible specimen could be protected for an indefinitely long period; one susceptible specimen stressed to 75% of its yield strength and held at this potential for 400 hours showed no evidence of stress corrosion. This potential of cathodic protection appeared to be independent of the stress applied to a specimen. Considerable evidence indicates that the potential reflected metallurgical structure rather than extraneous conditions such as the alkalinity produced by cathodic reactions. Author

N65-29118# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CRYSTAL STRUCTURE OF Sr_6Li_{23} COMPOUND
P. I. Kryp'yakevych and H. I. Oleksiv 15 Apr. 1965 5 p refs Transl. into ENGLISH from Dopovidi Akad. Nauk Ukr. RSR (Kiev), no. 11, 1963 p 1489–1491
(FTD-TT-64-1145/1; AD-614953)

X-ray diffraction analysis was used to establish the existence of the compound Sr_6Li_{23} (Th_6Mn_{23} type, a = 15.05 A). Author

N65-29127# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE MECHANISM OF OXIDATION OF NICKEL–CHROMIUM
A. S. Tumarev, L. A. Panyushin, and A. V. Guts 28 Jan. 1965 14 p refs Transl. into ENGLISH from Izv. Vyssh. Uchebn. Zaved., Chern. Met. (Moscow), no. 3, 1963 p 26–33
(FTD-TT-64-706/1+2; AD-610789)

An investigation was conducted to obtain quantitative data on the heat resistance of binary Ni–Cr alloys and data to explain the different heat resistance of alloys, depending on their

composition, on the basis of chemical, micrographic, and roentgen structural analysis. Alloys with compositions ranging from 100% Ni to 100% Cr were studied. Results of the investigation are discussed in detail. It was concluded that heat resistance of Ni–Cr alloys varies in a wide range depending on composition and structure of the scale and is the result of alloy oxidation formation which in turn is determined by the chemical composition of the alloy. R.N.A.

N65-29133# Bureau of Mines, Pittsburgh, Pa. Health and Safety Research and Testing Center.
EXPLOSIBILITY OF METAL POWDERS
Murray Jacobson, Austin R. Cooper, and John Nagy 1964 29 p refs
(BM-RI-6516)

Data obtained in the Bureau's study of dust explosions of 313 elemental metals, alloys, catalysts, and ores comprising 54 types of material are summarized. Information is given on ignition temperature, spark energy for ignition, minimum explosion concentration, explosion pressure, rate of pressure rise, and in some instances, the admixed inert dust and oxygen concentration in an atmosphere required to prevent ignition of dust dispersions. The effects of particle diameter on explosibility and pyrophoricity are also discussed. Author

18 MATERIALS, NONMETALLIC

Includes corrosion; physical and mechanical properties of materials (e.g., plastics); and elastomers, hydraulic fluids, etc. For basic research see: 06 Chemistry. For related information see also: 17 Materials, Metallic; 27 Propellants; and 32 Structural Mechanics.

N65-28239# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
REINFORCING CAPRON FIBRE WITH THE AID OF MODIFIED BENTONITE
I. O. Uskov, V. P. Solomko et al 20 Apr. 1965 7 p refs Transl. into ENGLISH from Dopovidi Akad. Nauk Uk. RSR (Kiev), no. 6, 1963 p 798–801
(FTD-TT-64-1184/1+2; AD-615232)

Investigated was the effect of high dispersion bentonite on the strength of capron fiber. The bentonite was modified by cation exchange with hydrochloride octadecylamine or by the effect of dimethyldichlorosilane. The molecular weight of polycaprolactam changes lightly in the the presence of filler. Introduction of small amounts of modified bentonite (about 1%) leads to an increase in strength at 20° by 10–12%. At greater filler concentrations strength decreases, and at 3% filler it becomes lower than in the unfilled polymer. Introduction of nonmodified bentonite causes a reduction in strength of the fiber. A rise in test temperature leads to total reduction in strength and reduction in maximum attainable relative reinforcement. Maximum reinforcement at 50° constitutes 7% of the strength of the unfilled fiber at very same temperature, and at 90° strengthening is not observed. Author

N65-28276# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PLASTICS AND RUBBER Selected Articles
29 Apr. 1965 25 p refs Transl. into ENGLISH from Plastics und Kautschuk (Leipzig), v. 11, no. 1, 1964 p 36–42
(FTD-TT-64-1324/1+2; AD-463087)

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N65-28277 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE INFLUENCE OF THE THERMAL AFTER-TREATMENT ON THE PROPERTIES OF POLYAMIDE COATINGS
Z. Kowalski *In its* Plastics and Rubber 29 Apr. 1965 p 1–12 refs Presented at the Intern. Metal, Plastic, and Ceramic Spray Conf., Halle (Saale), 10–12 Sep. 1963 (See N65-28276 17-18)

Poly undecanamide (polyamide 11) and poly caprolactum (polyamide 6) coating materials were applied to test specimens, which were then subjected to various after-treatments for determining the influence of each treatment on the structural properties of the coatings. Some of the after-treatments used were soaking and tempering in paraffin oil or water baths at differing temperature levels. Specimens were also subjected to infrared radiation, and oxygen. Various bending strength and impact resistance tests were applied after the treatments. It was shown that the characteristics of polyamide coatings can be materially changed by the influence of heat (positively and negatively), and do afford some protection from the influence of oxygen at high temperatures. The method of coating the specimen is also important, and coatings applied by turbulent sintering are more resistant to impact-type stresses than those that are flame sprayed. Polyamide 11 coatings were found superior to polyamide 6 coatings not only with regard to their natural properties, but also with regard to their impact resistance. Test data and physical property data of test materials are included. L.S.

N65-28278 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PLASTICS FOR FLAME SPRAYING AND THEIR CHARACTERISTICS
H. Schwarz *In its* Plastics and Rubber 29 Apr. 1965 p 13–26 refs (See N65-28276 17-18)

The mechanical and chemical properties of flame-sprayed PVC-soft, polyethylene, and polyamide coatings, and other important flame-spraying materials such as epoxy resin, bituminose masses, polysulfide rubbers, polymethylcrylate, polystyrene and polytrifluorochlorethylene are discussed. Tables giving characteristic values for the coatings and materials are included. L.S.

N65-28501# IIT Research Inst., Chicago, Ill. Technology Center
EFFECT OF ENVIRONMENT ON UNIAXIAL COMPRESSIVE FATIGUE PERFORMANCE OF GLASS FILAMENT REINFORCED PLASTIC LAMINATES Special Technical Report, 1 Oct. 1962–15 Nov. 1964
H. R. Nelson Nov. 1964 49 p ref
(Contracts NObs-90329; NObs-86461)
(AD-610540)

Uniaxial compressive fatigue performance is presented for wound flat plate laminates incorporating the E787 Resin System and reinforced with S994 Glass Cloth (Type 143), S994 Glass Roving, and PPG Hollow Glass Roving. A total of five conditioning and testing environments were imposed on specimens from the three laminate constructions. These included specimen tests: (1) dry, no preconditioning, (2) dry, after 500 hours–10,000 psi water exposure, (3) in water at zero

pressure, no preconditioning, (4) in water at 10,000 psi, no preconditioning, and (5) in water at 10,000 psi, after 500 hours–10,000 psi water exposure. Fatigue curves generated from specimen tests of the three laminates under the above environments are presented. Relative laminate performance is discussed and environmental effects are compared based on these curves. Equipment developed for performing specimen fatigue tests in air is described. The modification made to that equipment which permitted fatigue testing to be performed in the pressurized water environment, is also presented. Author

N65-28604# Army Corps of Engineers, Cincinnati, Ohio. Ohio River Div. Labs.
FIBROUS REINFORCEMENTS FOR PORTLAND CEMENT CONCRETE
G. R. Williamson May 1965 106 p refs
(TR-2-40; AD-465999)

Methods of increasing the flexural strength and shock resistance of concrete through the use of random fibrous reinforcements are presented. The materials used were various sizes and lengths of chopped steel wire, fiber glass, vinyl-coated fiber glass, and nylon. Only the nylon and the steel wire proved effective. The results of static, flectural, and compressive tests are given, along with results of impact tests and tests conducted with high explosives. The fibers were tested in four different mixes: neat cement, No. 50 maximum size aggregate, No. 8 maximum size aggregate, and 3/8-inch maximum size aggregate. A complete description of all the materials used as random reinforcement, and test procedures are presented. Selected nylon or wire mix designs that can be used for full-scale construction application or test sections are also given. N.E.A.

N65-28605# Carborundum Co., Niagara Falls, N. Y. Research and Development Div.
REFRACTORY MATERIALS SUITABLE FOR USE IN GUIDED MISSILE PROPULSION SYSTEMS Quarterly Progress Report
Bruno R. Miccioli and H. Paul Julien Jun. 1965 32 p refs
(Contract NOw-64-0412-c)
(QPR-6; AD-465428)

This quarterly progress report describes work progress in the study of refractory composites suitable for high temperature missile applications. Activities during this period have been devoted to refining fabrication techniques for obtaining "porous" carbide matrices. Associated physical property and materials evaluation information is also included. Author

N65-28616# Naval Applied Science Lab., Brooklyn, N. Y.
EVALUATION OF VOID CONTENT IN EPOXY-GLASS FILAMENT WOUND MATERIAL BY MICROWAVE TESTS
I. Birnbaum 18 May 1965 13 p refs
(TM-1; AD-615308)

Several selected samples of epoxy-glass filament wound material were tested in free space by microwave measurement techniques. The purpose of these tests was to seek significant relationships between percentage of void content and dielectric properties for practical application in nondestructive test procedures. The test results revealed that substantial amounts of void content in the test samples caused very small changes in the measured value of dielectric constant. Furthermore, these changes could not be distinguished from the effects of various other factors related to the test. Therefore, it was concluded that the free space measurement of dielectric constant was unsatisfactory as in indication of the distributed void content of the subject material. Author

N65-28623# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHOD OF PREPARATION OF COATINGS
I. S. Okhrimenko, V. A. Myshlennikova, and Yu. B. Shleomenzon 27 Apr. 1965 4 p Transl. into ENGLISH from Russian Patent No. 151739 (Appl. No. 774306/23-4, 11 Sep. 1961) 2 p
(FTD-TT-64-1278/1; AD-615248)

The object of the invention is a method of obtaining coatings on metal on the basis of organic dispersion of polymers containing fluorine which is distinguished by the fact, that for the purpose of expanding the assortment of applicable polymers, one uses for the latter fluorine rubber SKF-32. Author

N65-28628*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF ULTRAVIOLET IRRADIATION ON SELECTED PLASTIC FILMS IN VACUUM
Evelyn Anagnostou Washington, NASA, Jul. 1965 16 p refs
(NASA-TM-X-1124) CFSTI: HC $1.00/MF $0.50

Selected plastic films which had possible application as encapsulants for thin-film cadmium sulfide solar cells were irradiated in vacuum by ultraviolet light below 3000 angstroms for various lengths of time up to 5266 hours. The light intensity was between 0.67 and 1 times the integrated solar intensity below 3000 angstroms at 1 astronomical unit. The change in optical transmission with irradiation time was measured from 0.35 to 2.7 microns, and changes in percent elongation and breaking strength were measured at room temperature. Of the films tested, the most resistant to damage was H-film, a polyimide, and weather-durable Mylar was the next most resistant. Author

N65-28734# Rocky Flats Div., Dow Chemical Co., Golden, Colo.
THE COMPATIBILITY OF ION EXCHANGE RESIN AND PLASTICS WITH NITRIC AND OXIDES OF NITROGEN Interim Report
G. F. Molen 17 Jan. 1964 17 p
(CRDL-94561-1)

The compatibility of Dowex-1 × 4 nitrate form anion exchange resin with nitric acid, and the compatibility of several types of plastic tubing with nitric acid were investigated. Ignition properties of resin extract, treated resin and mixtures of tubing extract with either resin extract or treated resin were also investigated. Author

N65-28739# Princeton Univ., N. J. Frick Chemical Lab.
VISCOELASTIC PROPERTIES OF PHOSPHINATE POLYMERS
A. D. Mair and A. V. Tobolsky Jun. 1965 24 p refs
(Contract Nonr-1858(07))
(ONR-TR-RLT-89; AD-465910)

The viscoelastic properties of several phosphinate inorganic coordination polymers have been investigated. By utilizing a ballindentation method, the creep compliance, $J_c(t)$, has been measured as a function of time for two samples of zinc methylphenylphosphinate of differing molecular weight. From results at different temperatures, master curves of compliance versus time could be constructed using the time-temperature superposition principle. Both polymers are of low molecular weight in the solid state. The temperature dependence of the shift factors is of an Arrhenius form over most of the temperature range considered, giving apparent activation energies of 90 and 80 kcal/mole for lower and higher molecular weight samples respectively. Volume temperature measurements indicate that the glass transition temperature, T_g, for the higher molecular weight polymer is 58° C. The elastic modulus

of a 1:1 copolymer of zinc di-n-butylphosphinate and zinc di-n-octylphosphinate has been measured as a function of time and of temperature using torsional creep and stress relaxation techniques. Author

N65-28816 National Electrical Manufacturers Association, New York.
INDUSTRIAL LAMINATED THERMOSETTING PRODUCTS
1964 82 p Supersedes LP-1-1959
(LI-1-1965)

Standards and engineering information concerning the manufacture, test, and performance of laminated thermosetting sheets, tubes, and rods used in the manufacture of electrical apparatus and supplies are presented. R.N.A.

N65-28843# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
NEW WAYS OF SYNTHESIZING RUBBER
B. A. Dolgoplosk 29 Apr. 1965 14 p Transl. into ENGLISH from Priroda (Moscow), no. 5, 1963 p 30–35
(FTD-TT-64-1257/1+2; AD-615241)

A general, semi-technical, review is given of methods for the preparation of various types of synthetic rubber. Special attention is given to materials for use in demanding environments. Author

N65-28880# United Kingdom Atomic Energy Authority, Harwell (England).
ABRASION RESISTANCE OF IRRADIATED NYLON AND POLYETHYLENE
M. Torii Jan. 1965 8 p refs Transl. into ENGLISH from Radioisotopes (Tokyo), v. 13, no. 4, 1964 p 320–322
(AERE-TRANS-1024) HMSO: 1s 9d

Samples of nylon and polyethylene, irradiated by electron beam and gamma radiation, and also heat treated, were tested for their abrasion resistance. Both nylon and polyethylene show an increase in hardness after irradiation and a further increase in hardness after heat treatment. Specific gravity remains unchanged after irradiation but is increased by heat treatment. The increase in melting point resulting from irradiation in nylon is small but large in polyethylene. Electron beam irradiation of polyethylene causes bubble formation. Irradiation reduces the abrasion resistance in nylon and is less pronounced in irradiation with an electron beam than with gamma radiation. Heat treatment increases the abrasion resistance of both non-irradiated and gamma irradiated polyethylene samples. However, high doses of electron beam irradiation decrease the abrasion resistance, while heat treatment increases it. Irradiation slightly decreases the coefficient of friction of nylon, while in polyethylene it increases with dosage. R.N.A.

N65-29029# Deutsche Forschungsanstalt für Luft- und Raumfahrt, Brunswick (West Germany). Inst. für Flugmechanik.
ON THE EFFECTIVE POROSITY OF PARACHUTE CLOTH [EIN BEITRAG ZUR EFFEKTIVEN POROSITAT VON FALLSCHIRMGEWEBEN]
H.-D. Melzig Dec. 1964 26 p refs In GERMAN, ENGLISH summary
(DLR-FB-64-45) Available from Zentralstelle für Luftfahrtdokumentation und Inform. (ZLDI), Munich: 7 DM

This paper presents additional information on the principal behavior of air flow through cloths and grids in addition to the report on Effective Porosity of parachute cloth. The geometry of cloth could clearly be determined by tests on round wire webbing with determinable and constant wire thickness and size of mesh. Particulars on the influence of these geometrical values on drag coefficient or the Effective Porosity are thus obtained. Furthermore, the influence of Reynolds number, Mach number, and air density are discussed. The applicability of the general throttle equation derived by P. Hadlatsch is investigated. Author

N65-29074# Texas Instruments, Inc., Dallas.
NEW HIGH TEMPERATURE INFRARED TRANSMITTING GLASSES Third Semiannual Technical Summary Report, 1 Nov. 1963–30 Apr. 1964
Maurice J. Brall and A. Ray Hilton [1964] 36 p refs
(Contract Nonr-3810(00))
(TI-08-64-78; AD-440439)

Glasses formed in the Ge-P-Te system have moderately high softening points (as high as 390°C) and are essentially transparent to the infrared out to 20 microns wavelength. Their refractive indexes are greater than 3, and their glass-forming composition region is the smallest of all the systems evaluated. We found no ternary glass system using the group IVA element Sn that should be evaluated. With the Si-As-Te and Ge-As-Te glass systems as bases, the effect on the optical properties, softening point, and hardness was determined when P, Sb, S, and Se were substituted into the glasses. Efforts to definitely establish the origin of the undesirable absorptions in the most promising glasses will increase. Prisms made from these glasses will be cast and the refractive index accurately measured. Blending studies will continue. Author

N65-29121# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EFFECT OF TEMPERATURE ON FRICTION AND WEAR OF FILLED FLUORINATED PLASTIC MATERIALS
V. D. Parkhomenko and S. N. Gants 19 Apr. 1965 6 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Mashinostro. (Moscow), no. 9, 1963 p 130–133
(FTD-TT-64-1176/1+2; AD-614957)

An examination was made of the effect of temperature and the nature of the filler (molybdenum disulfide, boron nitride, barium sulfate, ground coke, talic, soot, or colloidal graphite) on the coefficient of friction and wear of 'Fluoroplast' (poly-(chlorotrifluoro ethylene)) while undergoing a witer-lubricated friction process. In general: (1) wear decreases with increasing filler content (up to a limit); (2) wear increases with increasing water temperature; (3) the coefficient of friction (mu) increases as temperature increases; (4) mu decreases with increasing specific pressure; and (5) mu decreases with increasing speed of sliding. Under the test conditions MoS_2, BN, $BaSO_4$, and coke improved the wear resistance to a greater extent than the other fillers. TAB

19 MATHEMATICS

Includes calculation methods and theory; and numerical analysis. For applications see: 08 Computers.

N65-27974# Boeing Co., Seattle, Wash. Scientific Research Labs.
TESTS FOR MONOTONE FAILURE RATE
Frank Proschan and Ronald Pyke (Washington Univ.) Mar. 1965 47 p refs
(DI-82-0422)

Physical considerations often lead one to expect that a distribution has increasing failure rate, and knowledge of increasing failure rate is mathematically useful in solving a variety of practical problems. In this paper, a non-parametric test to determine whether a sample comes from a population possessing an increasing failure rate is proposed and investigated. The test statistic is based only on the ordering of normalized spacings between the ordered observations. The distribution of the test statistic under the null hopothesis of constant failure rate is known. Suitably normalized, it is shown to be asymptotically normally distributed for a wide class of alternatives. In particular, under mild assumptions, when the underlying distribution has increasing failure rate, the test statistic is asymptotically normally distributed. The test is shown to be unbiased. The criterion of asymptotic relative efficiency is used to compare the test proposed with the likelihood ratio test for Weibull alternative and with the likelihood ratio test for Gamma alternatives. Author

N65-27976 Joint Publications Research Service, Washington, D. C.

DETERMINATION OF HAMILTONIAN PATHS OF SHORTEST LENGTH ON A COMPLETE GRAPH BY THE METHODS OF INTEGRAL PROGRAMMING

V. I. Mudrov *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 1–9 refs (See N65-27975 17-34) CFSTI: $6.00

The problem of finding Hamiltonian paths of shortest length on a complete graph is investigated. A procedure is indicated for mass obtaining of integral statements of linear programming equivalent to the indicated problem. Author

N65-27977 Joint Publications Research Service, Washington, D. C.

APPLICATION OF THE COINCIDENCE METHOD TO ANALYSIS OF RELIABILITY OF TECHNICAL SYSTEMS WHICH OPERATE IN THE STATIONARY CONDITION

N. M. Sedyakin *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 10–24 refs (See N65-27975 17-34) CFSTI: $6.00

A method is proposed for analysis of reliability of technical systems based on the mathematical apparatus of the theory of coincidence of pulses from a series of sources [2]. Some relationships are found which characterize the reliability of the system for the case of stationary condition of its operation. Author

N65-27978 Joint Publications Research Service, Washington, D. C.

AN APPROXIMATE ALGORITHM FOR CONSTRUCTION OF OPTIMALLY RELIABLE SYSTEMS WITH AN ARBITRARY STRUCTURE

I. A. Ushakov *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 25–32 refs (See N65-27975 17-34) CFSTI: $6.00

Some index of quality of operation (effectiveness) is determined in a general form for systems with arbitrary structure. The approximate algorithm is assumed for optimal distribution of "total weight" (or any other limiting factor) of the system among its elements for increasing their reliability with the purpose of achieving a maximum index of effectiveness. The algorithm is based on the method of most rapid slope as applied to problems of convex programming for linear limitations. Author

N65-27979 Joint Publications Research Services, Washington, D. C.

ON A PROCEDURE FOR SELECTION OF A MULTIDIMENSIONAL PARAMETER ON A DIGITAL COMPUTER

B. S. Fleyshman and V. F. Krapivin *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 33–47 refs (See N65-27975 17-34) CFSTI: $6.00

Algorithms are considered for evaluation of a multidimensional parameter on a digital computer. It is shown that the procedure of simultaneous parallel in time of selection values of components of the parameter permits significant decrease in the time of solution of the problem on the computer. Estimates are made of possibilities of realization of the selection procedure for the true value of the parameter using modern computers. Author

N65-27981 Joint Publications Research Service, Washington, D. C.

FUNCTIONAL DIVISIBILITY IN THREE VALUED LOGIC

V. I. Varshavskiy *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 58–63 refs (See N65-27975 17-34) CFSTI: $6.00

The conditions of functional divisibility of three valued logic functions are investigated. It is demonstrated that if in the triangular table which gives the function, the index of the rows $v \leq 3$, then the function is disjunctively divisible with respect to partitioning of the variables which makes up the table. It is shown that the remaining theorems of functional divisibility (nondisjunctive decomposition, complex decomposition) [1] do not depend on the significance of the logic. A simple algorithm for construction of the functional division is given. Author

N65-27984 Joint Publications Research Service, Washington, D. C.

ON A CLASS OF STOCHASTIC AUTOMATA

V. G. Sragovich and Yu. A. Flerov *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 91–101 refs (See N65-27975 17-34) CFSTI: $6.00

The construction of stochastic automata is proposed and their behavior in a game with a partner is investigated using mixed strategy. R.N.A.

N65-27999 Joint Publications Research Service, Washington, D. C.

ON THE PROBLEM OF CALCULATION OF LIMITATIONS ON DISTRIBUTION OF ROOTS OF THE CHARACTERISTIC EQUATION WHEN CALCULATING SYSTEMS WITH MINIMUM MEAN SQUARE ERROR

V. B. Larin *In its* News of the Acad. of Sci. USSR 9 Jun. 1965 p 265–268 refs (See N65-27975 17-34) CFSTI: $6.00

The problem of determining an optimal pulse transfer function is posed for minimization of the mean square error using a filter on the distribution of roots of the characteristic equation of which a limitation is imposed with respect to the degree of stability. R.N.A.

N65-28053 Joint Publications Research Service, Washington, D. C.

PERIODIC OSCILLATIONS OF NONLINEAR NONAUTONOMOUS SYSTEMS WITH MANY DEGREES OF FREEDOM

Yu. M. Kopnin *In its* Eng. J. 29 Jun. 1965 p 21–36 refs (See N65-28050 17-23) CFSTI: $6.00

The problem of finding the periodic solutions of a system of differential equations of general form using the Poincaré scheme is considered. A method is given for the construction of

the desired solutions, also the so-called singular cases. The problem has been considered in this formulation for particular forms of differential equations. Author

N65-28143# Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
ESTIMATIONS IN PARTIAL DIFFERENTIAL EQUATIONS
Johann Schröder Apr. 1965 34 p refs *Its* Mathematical Note No. 407
(DI-82-0431)

A general principle for error estimation is described which can be applied to different types of partial differential equations. Particular attention is paid to nonlinear problems. With a programmed procedure based on this estimation principle, error bounds are calculated for boundary value problems involving the differential equation $-\Delta u + f(x,y,u) = 0$. Author

N65-28161# McGill Univ., Montreal (Quebec).
CERTAIN STUDIES ON THE STRUCTURE AND STATISTICS OF THE LOGARITHMIC SERIES DISTRIBUTION AND RELATED TABLES
G. P. Patil, A. R. Kamat, and J. K. Wani Wright-Patterson AFB, Ohio, ARL, Nov. 1961 396 p refs
(Contract AF 33(657)-11559)
(ARL-64-197; AD-610635)

The present report studies the structure and statistics of the logarithmic series distribution (LSD) and provides a few useful tables that are intimately related to these studies. It investigates crude and central moments, incomplete moments, factorial moments, absolute moments, Geary ratios and develops a few interesting characterizations for the LSD. It considers estimation problems for the LSD using methods of maximum likelihood estimation and the minimum variance unbiased estimation. It records some of the different formulations of the LSD as a probability model and discusses briefly different types of applications illustrated with real data collected from diversified fields of application. It attempts in particular to analyze at length the R.A. Fisher's reasoning to the ecological problem of species and individuals that originally led to the LSD. It provides an extensive bibliography on the LSD and related topics. Among a few other important tabulations, it provides extensive tables for the probability and distribution functions of the LSD. Author

N65-28211# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ESTIMATION OF THE SCALE PARAMETER OF THE LOGNORMAL DISTRIBUTION BY M ORDER STATISTICS
Eugene Raymond Highfield (M.S. Thesis) Aug. 1964 66 p refs
(GRE-MATH-64-8; AD-610770)

Unbiased single order statistic and m-order statistic estimators of the scale parameter of a truncated lognormal probability density function are developed. It is assumed that the location parameter is known and that if it is not zero, a transformed variable with a location parameter approximately zero can be obtained. The development method of the single-order-statistic estimator was to consider the expected value of the i-th order statistic. The m-order-statistic estimator development uses the development of the single-order-statistic estimator and then considers the variance of the m-order-statistic estimator as a Lagrangian function which is minimized to obtain the necessary weighting factors. These weighting factors are then combined with the other coefficients to obtain the desired multipliers. The multipliers used to obtain the estimators, the variance of the estimators, and their relative efficiencies are tabulated. R.N.A.

N65-28212# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MONTE CARLO TECHNIQUE FOR OBTAINING SYSTEM RELIABILITY CONFIDENCE LIMITS FROM COMPONENT FAILURE TEST DATA.
Louis L. Levy (M.S. Thesis) Aug. 1964 89 p refs
(GRE-MATH-64-9; AD-610773)

A digital computer technique is developed, using Monte Carlo simulation based on common probability failure models, with which component failure test data may be translated into system reliability confidence limits at any specified confidence level for systems composed of elements exhibiting different failure patterns. Derivation of predicted confidence limits for such systems cannot be accomplished analytically. Since reliability prediction is meaningful only when expressed within a range of values and with an associated confidence that the true reliability is within that range, a valuable and economic tool is provided for the reliability analyst. Author

N65-28231# RAND Corp., Santa Monica, Calif.
TRANSVERSALS AND MATROID PARTITION
Jack Edmonds and D. R. Fulkerson (Natl. Bur. of Std.) May 1965 130 p refs
(Contract AF 49(638)-700; Proj. RAND)
(RM-4608-PR; AD-615663)

A matroid M = (E, F) is a finite set E of elements and a family F of subsets of E, called independent sets, such that (1) every subset of an independent set is independent, and (2) for every set A belonging to E, all maximal independent subsets of A have the same cardinality, called the rank R(A) of A. The concept of 'matroid' thus generalizes that of 'matrix' or, in particular, that of 'graph.' This paper treats a variety of partition problems involving independent sets of matroids. TAB

N65-28369# Wisconsin Univ., Madison.
THE SPECTRA OF INFINITELY OSCILLATING POTENTIALS III Technical Summary Report
J. B. Mc Leod Feb. 1965 27 p refs
(Contract DA-11-022-ORD-2059)
(MRC-549; AD-614812)

The paper discusses the differential equation

$$\frac{d^2y}{dx^2} + \{\lambda - q(x)\}y = 0 \qquad (0 \le x < \infty), \qquad (1)$$

where

$$q(x) = \begin{cases} c^2u_n^2 & (n - \frac{1}{2} \le x \le n), \\ -c^2v_n^2 & (n < x < n + \frac{1}{2}), \end{cases}$$

and $\{u_n\}$, $\{v_n\}$ are two sequences of positive numbers tending to infinity. Even if we restrict ourselves to cases in which $u_n = v_n$ and u_n and u_{n+1} are of the same order, we can arrange the choice of u_n so that any given closed set S on the real λ-axis (and $\pm\infty$) forms the essential spectrum for the problem. Further, if S_1, S_2 are any two bounded closed sets, we can change the essential spectrum from S_1 to S_2 using only a bounded perturbation. At the same time, with virtually no restrictions on the sequences $\{u_n\}$, $\{v_n\}$ except that they tend to infinity, the spectrum associated with (1) is, for almost all c, the whole real λ-axis. Author

N65-28473# National Aerospace Lab., Tokyo (Japan).
CHARACTERISTIC METHOD FOR THE NUMERICAL SOLUTION OF TWO-DIMENSIONAL QUASI-LINEAR HYPERBOLIC SYSTEMS
Hajime Miyoshi 1965 25 p refs In JAPANESE; ENGLISH summary
(NAL-TR-78)

The numerical solution of two-dimensional quasi-linear hyperbolic systems is studied, by the characteristic method. A general method for constructing the approximate equations for the numerical solution and a proof for the local convergence of its solution are presented here. Some numerical examples are given. Author

N65-28518# Centre National de la Recherche Scientifique, Paris (France). Centre d'Etudes Mathematiques en vue des Applications.
MATHEMATICAL FORMULAE FOR THE USE OF DOCTORS AND ENGINEERS. PART VI: DIFFERENTIAL EQUATIONS [FORMULAIRE DE MATHEMATIQUES A L'USAGE DES PHYSICIENS ET DES INGENIEURS. FASCICULE VI: EQUATIONS DIFFERENTIELLES]
Robert Campbell and Georges Reeb 1964 77 p refs In FRENCH

A concise text on differential equations is presented. Methods of exact integration of first- and higher-order differential equations, and of series approximation of integrals, are reviewed briefly. Theory of differential equations both in the real and complex domains is presented, with reference to the linear differential equation form, singularity of solutions, and existence theorems. General properties of trajectories, periodic trajectories, and two-dimensional motion over a surface are also discussed. Trans. by J.M.D.

N65-28630*# Research Triangle Inst., Durham, N. C.
THE VARIANCE OF THE NUMBER OF ZEROS OF STATIONARY NORMAL PROCESSES
J. D. Cryer and M. R. Leadbetter Washington, NASA, Jul. 1965 30 p refs
(Contract NASw-905)
(NASA-CR-259) CFSTI: HC $2.00/MF $0.50 CSCL 12A

Theoretical results on probabilistic modeling are documented, with primary emphasis placed on the rigorous mathematical development of an expression for the variance of the number of zeros of a stationary random process. The major theoretical results are stated as a theorem, with a practical method for computing the desired variance quantity given. The mathematical rigor for proof of the theorem is also presented. M.G.J.

N65-28648# National Univ. of Ireland, Cork.
THIN ELASTIC PLATES AND SHELLS, PILE GROUPS, MAGNETIC FILMS AND NON-LINEAR BENDING Final Scientific Report
Patrick M. Quinlan 15 Mar. 1965 9 p refs
(Grant AF-EOAR-63-21)
(AFOSR-65-0738; AD-615440)

The development of the γ-method for providing a particular solution to linear boundary-value problems of the type

$$F(D_1^2, D_2^2)W = f(x, y); D_1 = \frac{\delta}{\delta x}, D_2 = \frac{\delta}{\delta y},$$

where F is a homogeneous polynomial, of any order, and the boundary conditions are linear in W and its derivatives, is reported. The edge-function method provides the necessary complementary functions. The ensuing simultaneous equations from the boundary conditions in a polygonal region are expressed in the form of an algorithm for easy programing. Also, abstracts on the following subjects are included: (1) the torsion of an irregular polygon; (2) the γ-method for rectangular plates. (3) the γ-method for aeolotropic rectangular and skew plates; and (4) non-linear bending of an annular plate. E.E.B.

N65-28651# RAND Corp., Santa Monica, Calif.
ANALYTIC EVALUATION OF THE FOURIER COEFFICIENTS OF A CLIPPED PERIODIC FUNCTION
Marvin Blum May 1965 41 p refs
(P-3137; AD-615316)

For periodic input u(t), a time representation c(t) for the clipper is obtained such that the output y(t) = c(t) u(t). The Fourier coefficients of y(t) are obtained in terms of the Fourier coefficients of both c(t) and u(t). For light clipping, the Fourier coefficients of y(t) equal the Fourier coefficients of u(t) plus a small correction factor of the order of the per cent of time the signal exceeds clipping limits. An exact expression for the correction factor is obtained which may require numerical solutions. Some algorithms for obtaining numerical solutions are discussed. Author

N65-28655# RAND Corp., Santa Monica, Calif.
A RELATION BETWEEN EXPONENTIAL AND POLYNOMIAL METHODS FOR THE NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS
Paul Brock Apr. 1965 7 p ref
(AD-614897)

Two classical methods for the numerical solution of ordinary differential equations are to approximate the function to be integrated either by a polynomial or as the sum of exponentials. This article demonstrates that polynomial approximation method is a special, degenerate form of the exponential approximation method. N.E.A.

N65-28658# Illinois Univ., Urbana. Coordinated Science Lab.
OPTIMAL MATCHING OF LINEAR TIME-VARYING NETWORKS
Robert John Tracey Apr. 1965 31 p refs
(Contract DA-28-043-AMC-00073(E))
(R-2-52; AD-614800)

The calculus of variations is used to obtain the optimal load network for a linear time-varying n-port network excited at each port by arbitrary signals. The given network is represented using a state variable description; use of a matrix of Lagrange multipliers in the variational process then leads directly to the state variable description of the adjoint matching network. The choice of anticipative or non-anticipative load networks is considered. The general result is then specialized to obtain the usual condition required for matching time-invariant networks in the periodic steady state. Conditions which guarantee the existence of an optimal match are obtained from the second variation. Finally, the entire matching process is interpreted in terms of the lossy and lossless parts of the network response. Author

N65-28663# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DETERMINATION OF A DIFFERENTIAL EQUATION FROM TWO SPECTRA
B. M. Levitan and M. G. Gasymov 5 May 1965 89 p refs Transl.

into ENGLISH from Usp. Mat. Nauk (Moscow), v. 19, no. 2, 1964 p 3-63
(FTD-TT-65-65/1+2; AD-615531)

This paper is devoted basically to solution of the following problem: given two sequences of real numbers $\lambda_0, \lambda_1, \ldots \lambda_n, \ldots$; $\mu_0, \mu_1, \ldots, \mu_n, \ldots$ what are the necessary and sufficient conditions for these sequences to be two spectra of the same Strum–Liouville operator of the form

$$y'' + [\lambda - q(x)]\, y = 0 \quad (0 \leq x \leq \infty)$$

for the various boundary conditions? Here q(x) is a real function that is summable on each interval (0,b'), b' < b. A complete solution of the problem is given in the case of a regular Strum–Liouville operator and a partial solution in the singular case. N.E.A.

N65-28672# Rochester Univ., N. Y. Dept. of Physics and Astronomy.
ALGEBRA OF CURRENTS AND SYMMETRY
Susumu Okubo 24 May 1965 11 p refs Submitted for Publication
(Contract AT(30-1)-875)
(UR-875-87)

N65-28673# Rochester Univ., N. Y. Dept. of Physics and Astronomy.
ALGEBRA OF CURRENTS AND GETTINGS SU(6) RESULTS FROM SU(4)+
C. Ryan 22 Jun. 1965 12 p refs Submitted for Publication
(Contract AT(30-1)-875)
(UR-875-89)

Within the framework of the algebra of currents approach of B. W. Lee, it is shown that apart from a slight complication the Su_6 results for the ratios G_A/G_V and μ_p/μ_n are still obtained when the assumption of SU(3) invariance is relaxed and only isospin SU(2) symmetry is required. Author

N65-28712# Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
PATHS IN POLYHEDRA, I Mathematical Note No. 372
Victor Klee (Washington Univ.) Oct. 1964 29 p refs
(DI-82-0382)

The behavior of paths in polyhedra relative to the number of facets is investigated in terms of its importance to linear programing. It is asserted that the polytopes which are polar or combinatorially dual to the cyclic polytopes all admit Hamiltonian circuits. It is conjectured that this leads to a sharp upper bound for the lengths of simple paths admitted by polyhedra of given dimension and with a given number of facets. Also considered is another conjecture which states that any two vertices of a polyhedron P can be joined by a path in P which never returns to a facet from which it has earlier departed. A polyhedron is defined as a set which is the intersection of finitely many closed half-spaces in a finite-dimensional real linear space; a polytope is a bounded polyhedron; and a path in P is a finite sequence of consecutively adjacent vertices. M.W.R.

N65-28741# California Univ., Los Angeles. Numerical Analysis Research.
HILBERT-SPACE METHODS IN ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS
Edward Milton Landesman (Ph.D. Thesis) May 1965 78 p refs
(Contract Nonr-233(76))
(AD-465692)

The purpose of this paper is to study together with applications those aspects of the theory of Hilbert-Space which are pertinent to the theory of elliptic partial differential equations. This involves the study of an unbounded operator A from one Hilbert-Space to another together with its adjoint A^*, its pseudo-inverse or generalized reciprocal A^{-1}, and its *-reciprocal $A' = A^{*-1}$. In order to carry out the results, further properties of the operators A^{-1} and A' are developed in this paper. In addition, the concepts of relative compactness and finite character are studied. These concepts play a significant role in the theory of partial differential equations. Author

N65-28826# Lockheed Missiles and Space Co., Sunnyvale, Calif.
ON THE QUESTION OF THE CONVERGENCE OF THE METHOD OF INTEGRAL RELATIONS
V. V. Bobkov [1963] 5 p refs Transl. into ENGLISH from Dokl. Akad. Nauk Belorusskoi SSR, v. 8, no. 1, 1964 p 5-9

The method of approximate solution of partial differential equations proposed by Dorodnitsyn is discussed. Although this method has been used to solve many problems, the convergence of the method has not generally been proved. The method of integral relations is applied to equations of different kinds, and estimates of the error of this method are derived. E.E.B.

N65-28925# Oak Ridge National Lab., Tenn.
ON THE RADICAL OF A HEMIRING
D. R. La Torre (Ph.D. Thesis–Tennessee Univ.) Jul. 1965 52 p refs
(Contract W-7405-ENG-26)
(ORNL-3655) CFSTI: $3.00

Several concepts of radicals in a hemiring are investigated. In particular, the Jacobson radical of a hemiring is shown to be characterized as the intersection of a certain class of k-ideals. It is proved that if the semiring S is actually a ring, then the Jacobson radical of S coincides with the Jacobson ring radical of S. The main subject of the paper deals with the Brown–McCoy radicals. One of the main results is the characterization of the FH-radical of a hemiring of type H as the intersection of a class of h-ideals. It is also shown that if S is a hemiring of type H with H-radical N, and if S_n is of type H, then the H-radical of S_n is just N_n. A sufficient condition to insure that S is of type H if and only if S_n is of type H is given. E.E.B.

N65-28968# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LINEAR DIFFERENTIAL EQUATIONS WITH DELAY, DEPENDING LINEARLY UPON ARGUMENT
K. G. Valeyev 16 Apr. 1965 28 p refs Transl. into ENGLISH from Sibirskiy Mat. Zhur. (Moscow), v. 5, no. 2, 1964 p 290–309
(FTD-TT-64-1167/1; AD-615226)

In this report is explained a sufficiently complete theory of linear differential equations with constant coefficients and delays of the argument, which appear to be linear functions of the argument. Discussed are analytical properties of solutions, their images according to Laplace, representation of solutions and their descriptions in form of definite series. Especially separated was a simple case when the delays are directly proportional to the argument. Greater attention was devoted to problems of stability of the solutions. The proposed theory can be, for example, used when investigating continuous control of escaping objects from distances, when the delay cannot be disregarded. Author

N65-29031# Lockheed Missiles and Space Co., Palo Alto, Calif. Research Lab.
INTERVAL ARITHMETIC WITH SOME APPLICATIONS FOR DIGITAL COMPUTERS
Sidney Shayer Jul. 1965 91 p refs
(LMSC-5-13-65-12)

A proposed solution to the problem of finding rigorous error bounds by the use of interval arithmetic is presented. Interval arithmetic is a method of computation in which the rational operations on real numbers are replaced by corresponding operations on closed intervals. It is shown that such a replacement is always possible. Also, an algorithm is given for the computation of certain functions by the Taylor series which has error bounds built into the algorithm. Further, closed intervals are employed to solve the initial-value first-order differential equation $dy/dx = f(x, y)$ where $y(x_0) = y_0$. E.E.B.

N65-29098# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SYNTHESIS OF AUTOMATIC CONTROL SYSTEMS BY THE METHOD OF SUCCESSIVE APPROXIMATIONS
T. A. Khalilov 28 May 1965 10 p refs Transl. into ENGLISH from Izv. Akad. Nauk Azerb. SSR, Ser. Fiz-Mat. i Tekhn. Nauk (Baku), no. 2, 1964 p 115–119
(FTD-TT-65-429/1; AD-615869)

A method of successive approximations is used to solve the problem of the synthesis of automatic control systems with any number of variable parameters. The method is analytical and makes it possible to determine the effect of all the variable parameters together on the position of roots of the characteristic equation. The method permits simple geometric interpretation for seeking the point of n-metric space in which some given functions take on values which satisfy the requirements of the technical assignment. R.N.A.

N65-29109# Air Force Cambridge Research Labs., Bedford, Mass. Solid State Sciences Lab.
ON THE THEORY OF BOOLEAN FORMULAS: SUBFORMULAS AND SUBSTITUTION OPERATORS
L. Calabi (Parke Mathematical Labs.) and E. W. Samson May 1965 41 p refs *Its* Phys. and Mat. Sci. Res. Papers No. 103 (AFCRL-65-321; AD-616122)

Substitution operators for subformulas of Boolean formulas are introduced and investigated. This requires preliminary definition and study of subformulas, mediators (for a formal treatment of "appearances"), and various related notions. Of particular importance for applications are the results concerning relations between substitutions, the Boolean operations, and the inclusion relation. Author

N65-29117# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A NEW METHOD OF SOLVING THE PROBLEM OF LINEAR PROGRAMMING
K. L. Yushchenko 15 Apr. 1965 9 p Trans. into ENGLISH from Obchyslyuval'na Mat. i Tekhn., Akad. Nauk Ukr. SSR, 1963 p 40–44
(FTD-TT-64-1144/1; AD-614952)

Proposed is a new method of solving linear programming problems, based on the use of one of R-operations, introduced by V. L. Rvachov (On Analytical Description Of Certain Geometric Images). The assumption about the nonlinearity of inequalities is used essentially only for the purpose of simplifying the calculations. In this way, the method can be applied also to solving other problems of mathematical (nonlinear) programming. Author

20 METEOROLOGY

Includes climatology; weather forecasting; and visibility studies. For related information see also: 13 Geophysics; and 30 Space Sciences.

N65-28175# Joint Publications Research Service, Washington, D. C.
TRANSLATIONS FROM METEOROLOGIYA I GIDROLOGIYA (METEOROLOGY AND HYDROLOGY), NO. 6, 1965
2 Jul. 1965 68 p refs Transl. into ENGLISH from Meteorol. i Gidrol. (Moscow), no. 6, 1965 p 3–6, 14–29, 34–35, 46–48, 52–59
(JPRS-30924; TT-65-31423) CFSTI: $3.00

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N65-28176 Joint Publications Research Service, Washington, D. C.
JOINT USE OF DIGITAL AND ANALOG COMPUTERS IN HYDROLOGICAL FORECASTS
L. S. Kuchment and N. S. Nechayeva *In its* Transl. from Meteorol. i Gidrol. 1965 p 7–13 refs (See N65-28175 17-20) CFSTI: $3.00

In developing methods of hydrological forecasts for river systems, difficulties arise in connection with an inadequacy of hydrometric and morphometric information, particularly in sectors of rivers where flow is not considered in the measurements. Existing methods for precomputing the hydrographs of runoff are based on the empirical selection of hydraulic and morphometric characteristics. The need for an empirical selection decreases the effectiveness of hydrodynamic methods and in sectors of rivers with complex hydrological conditions it is easier to use methods which employ a small number of empirical parameters integrally reflecting the hydraulic and morphometric characteristics of the river. The selection of empirical parameters when using simple linear methods of computation of non-steady state movement is accomplished using analog computers. However, they have difficulty in precomputing the water regime for large river systems. By using digital computers along with the analog computers the forecast output for an entire river system can be accomplished and parameters for individual parts of rivers can be selected, respectively. R.N.A.

N65-28177 Joint Publications Research Service, Washington, D. C.
MESOSTRUCTURE OF FRONTAL PRECIPITATION
A. I. Romov *In its* Transl. from Meteorol. i Gidrol., 1965 p 14–21 refs (See N65-28175 17-20) CFSTI: $3.00

The mesostructure of frontal precipitation was investigated on the basis of data from an experimental meteorological polygon with an area of 50 by 75 km and a dense pluviographic network. Time charts of the beginning and end of two periods of precipitation are illustrated and discussed. The charts do not confirm that there is a gradual and smooth propagation of continuous frontal precipitation. The charts show that the intensity of precipitation changes appreciably in short distances. These variations are the result of a special form of convection on fronts caused by horizontal mesoscale inhomogeneities in the temperature field. These inhomogeneities in the form of closed and semiclosed regions of heat and cold can be formed in the free atmosphere along the front as a result of its wavelike deformation caused by temperature advection. A similarity was found to exist between zonal waves in continuous precipitation and radar detected parallel zones of precipitation discovered in storms and squall lines. R.N.A.

N65-28178 Joint Publications Research Service, Washington, D. C.
SOME RESULTS OF NUMERICAL ANALYSIS OF THE VERTICAL DISTRIBUTION OF OZONE
V. M. Berezin and Yu. A. Shafrin *In its* Transl. from Meteorol. i Gidrol., 1965 p 22–32 refs (See N65-28175 17-20) CFSTI: $3.00

A study of the patterns of vertical distribution of ozone in relation to vertical and horizontal movements in the atmosphere and turbulent diffusion is presented. Results from the study indicate the possibility of quantitative estimates of vertical currents in the atmosphere on the basis of variation of the height of the maximum of the vertical distribution of ozone and also qualitative evaluations of the characteristics of turbulence in the upper troposphere and lower stratosphere. N.E.A.

N65-28179 Joint Publications Research Service, Washington, D. C.
STRATOSPHERE WARMING OVER ANTARCTICA IN THE WINTER OF 1964 (OBSERVATIONS AT MIRNYY)
Yu. K. Fedorov *In its* Transl. from Meteorol. i Gidrol., No. 6, 1965 2 Jul. 1965 p 33–36 (See N65-28175 17-20) CFSTI: $3.00

A distinguishing characteristic of the winter of 1964 at Mirnyy (Antarctica) in comparison with preceding years was a poorly developed cyclonic activity in the troposphere. In the stratosphere there was an exceptionally early warming, setting in beginning in August. Subsequent warmings were longer and involved virtually the entire lower stratosphere. Particular strong warmings were observed in the period 31 August to 8 September and 13 to 17 September. Warmings in the stratosphere usually were accompanied by very strong winds. The results of comparisons of these data and the observational data of the Third (1958) and Sixth (1961) Soviet Antarctica Expeditions are presented. N.E.A.

N65-28181 Joint Publications Research Service, Washington, D. C.
LITERATURE ON METEOROLOGY AND HYDROLOGY FOR 1964
In its Transl. from Meteorol. i Gidrol., No. 6, 1965 2 Jul. 1965 p 44–55 refs (See N65-28175 17-20) CFSTI: $3.00

This article present 110 bibliographies from a Russian publication, *Meteorology and Hydrology*. The bibliographies are listed under the following sections: (1) meteorology; (2) agrometeorology; and (3) hydrology. N.E.A.

N65-28519# France. Direction de la Meteorologie Nationale, Paris.
CLIMATOLOGY OF THE MARSEILLE-MARIGNANE AERODROME [CLIMATOLOGIE DE L'AERODROME DE MARSEILLE-MARIGNANE]
L. Ollier, A. Tasson, and R. Bubeck Mar. 1965 57 p In FRENCH *Its* Monographies de la Meteorologie Nationale No. 41

The topology of the Marseille-Marignane airport and surrounding areas is described and some general comments on temperature, precipitation, visibility, ceiling, and wind are given. Synoptical charts are presented. Trans. by E.W.

N65-28574# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
METEOROLOGICAL TECHNIQUES FOR SOUND RANGING Interim Report No. 1, 1 Oct. 1964–28 Feb. 1965
F. M. Wiener et al 2 Mar. 1965 25 p
(Contract DA-38-043-AMC-00151(E))
(BBN-1235; AD-615407)

The results of preliminary analytical and computer studies of selected Ft. Sill firing data are presented. The work carried out is sub-divided into three areas: (1) meteorological studies; (2) sound propagation studies; and (3) computer studies and error analysis. A technical discussion is presented on each of the areas listed. N.E.A.

N65-28603# Bergen Univ. (Norway). Geophysics Inst.
STATISTICS OF METEOROLOGICAL VARIABLES Final Report
C. L. Godske Jan. 1965 120 p refs
(Contract AF 61(052)-416)
(AFCRL-65-326; AD-465435)

Studies of statistical models in climatology concentrated on the effect of short-range changes, with air temperature the first variable to be considered. Equations are given for the multi-dimensional probability distribution which is the fundamental model concept in true statistical meteorology. Climatological syntheses of different orders, and statistical weather forecasting as a special type of this synthesis are discussed. Statistical properties of isolated meteorological variables; multidimensional distributions in meteorology; biharmonic temperature analysis; indirect determinations of temperature; stationary time series, and markov chains in meteorology; chains of stationary time series and their application to the study of diurnal variations; general stochastic processes; and a climatological synthesis for Norway are described in detail. It was concluded that statistics are helpful in deriving models for the phenomena being considered, and in judging the fit of these models. However, it may be necessary to adapt different methods to the nature of the phenomena; for example, to test the randomness of sequences, use can be made of runs above or below the median; runs up and down; statistics based on sign of differences; and the circular serial coefficient and rank correlation coefficient tests. These tests can supplement the chi-square test, and can be used with time series and Markov processes. M.G.J.

N65-28814# National Weather Satellite Center, Washington, D. C.
CATALOGUE OF TIROS VII AND VIII CLOUD PHOTOGRAPHY FOR OCTOBER, NOVEMBER, AND DECEMBER 1964
Jan. 1965 184 p

N65-28993# Hawaii Inst. of Geophysics, Honolulu. Dept. of Geosciences.
TIROS OBSERVATIONS OF TYPHOON FORMATION Scientific Report No. 1
Michio Shiroma and James C. Sadler Jan. 1965 66 p refs
(Contract AF 19(628)-3860)
(HIG-65-3; AFCRL-65-24; AD-613281)

Data from conventional sources, including aircraft reconnaissance, are utilized in an effort to interpret and determine the utility of meteorological satellite photographs during the important early phases of tropical cyclone development and intensification to typhoon intensity. This study involves three cyclones. Two developed from vortices embedded in the low-level monsoon trough and the third from an initial vortex in the upper-tropospheric trough. The initial vortices are evident in the wind field before becoming recognizable in the TIROS pictures. They become apparent as vortices in the pictures before they reach tropical storm intensity. Recognizable changes occur in the TIROS views as the storms intensify to typhoon intensity. Author

21 NAVIGATION

Includes guidance; autopilots; star and planet tracking; inertial platforms; and air traffic control. For related information see also: 07 Communications.

N65-27996 Joint Publications Research Service, Washington, D. C.
BEHAVIOR OF INERTIAL SYSTEMS OF NAVIGATION FOR HIGH SPEED FLIGHT
L. V. Kondrat'yev *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 235–250 refs (See N65-27975 17-34) CFSTI: $6.00

As a result of analysis of equations of an inertial system hodographs are obtained of the roots of the characteristic equation for errors in determination of the coordinates of the lengthwise and lateral motions of a flying apparatus which corresponds to variation in the angular velocity of the motion in the entire possible range. The qualitative peculiarities of behavior of inertial systems are investigated for high speed flight. The results obtained for V = 8km/sec are compared with the known propositions of celestial mechanics. Author

N65-27997 Joint Publications Research Service, Washington, D. C.
AN INERTIAL NAVIGATION SYSTEM IN THE CARTESIAN SYSTEM OF COORDINATES STEREOGRAPHICALLY REFLECTED ON A SPHERE
V. S. Kamenskiy *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 251–259 ref (See N65-27975 17-34) CFSTI: $6.00

A system of coordinates is proposed which is convenient for navigation in polar regions; an inertial navigation system is considered in the proposed system of coordinates. Author

N65-28160# Technical Research Group, Inc., Melville, N. Y. Quantum Electronics Dept.
DOPPLER OPTICAL NAVIGATOR Interim Engineering Report No. 2, 1 Sep.–30 Nov. 1964
A. L. Pogoda, J. T. La Tourrette, S. Jarrett, S. Jacobs, and S. Reich [1964] 31 p
(Contract AF 33(615)-1973)
(TRG-019-1-2; AD-610737)

Progress is reported on a program to determine the feasibility of techniques leading to a Doppler optical navigator for measuring instantaneous ground speed with 0.1 ft/sec accuracy for altitudes of 250 to 5000 feet. Present microwave Doppler radars are limited to short term accuracy due to the large relative bandwidth of the Doppler return signal which is caused by the large bandwidth (2°). A Doppler optical sensor using a laser transmitter will generate a narrow beam which results in a Doppler return of narrow bandwidth. The approach chosen utilizes a CW laser as a transmitter and detects the Doppler shift in the carrier frequency using optical heterodying techniques. During the report period, the work effort included: (1) scanning noise measurements with focused and collimated Laser beams; (2) evaluation of fabrication techniques for a folded laser oscillator amplifier configuration; (3) experimental investigation to determine best gas pressure for 3.5μ HeXe laser; and (4) continuation of electronics design. N.E.A.

N65-28248*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AN ITERATIVE GUIDANCE SCHEME AND ITS APPLICATION TO LUNAR LANDING
Helmut J. Horn, Daniel T. Martin, and Doris C. Chandler Washington, NASA, Jul. 1965 37 p refs
(NASA-TN-D-2869) CFSTI: HC $2.00/MF $0.50 CSCL 17G

A guidance scheme for vehicle flight from lunar orbit to a prescribed point on a spherical, non-rotating moon is presented. The equations of motion have been simplified only to permit a closed solution for the thrust magnitude and thrust direction. The trajectory computations themselves are made under more realistic and accurate assumptions and are not included. This scheme is another approach to the problem of adaptive guidance mechanization for vacuum flight. The more salient features of the scheme are the limited number of presettings, the closeness to optimization, the closed form solution, and the "homing" feature; i.e., the guidance information is improved as the end point is approached. The effectiveness of the scheme and the required thrust variations are displayed in Tables I and II. Two flight profiles have been considered: continuous burn of one RL-10 engine for main braking from a 100 km lunar orbit to the beginning of the terminal braking phase at 300 meters altitude; ignition of three RL-10 engines at the 15 km periselenum of a Hohmann transfer ellipse from a 100 n. mi. circular orbit with burn to 300 meters altitude. A description of a timer ignition scheme is given in the appendix. Author

N65-28364# Massachusetts Inst. of Tech., Cambridge. Instrumentation Lab.
APPLICATION OF INERTIAL LOCATOR CONCEPTS TO FAA BASIC FLIGHT INSPECTION, VOLUME I Final Report
Robert L. Hall, John Hatfield et al Jan. 1965 119 p refs
(Contract FA-64-WA-5139)
(SRDS-RD-65-9; R-483; AD-615418)

The feasibility of using an airborne inertial navigation system to provide aircraft position information to the FAA basic flight inspection system was investigated. The inertial system, in addition to providing a record of the present and previous positions of the aircraft plus an indication of direction and distance to any specified location, may be used to control the aircraft to fly specified paths. From the study, it appears that inspection requirements are achievable with equipment and techniques within the current state of the art, except that a hybrid system must be used in certain cases. It is observed that predicted performance is achievable as all-weather, 24-hr operations, with no restrictions other than those associated with flying the aircraft, and with no additional maintenance, equipment, or personnel other than those currently in use at the stations to be inspected. E.E.B.

N65-28714# Federal Aviation Agency, Atlantic City, N. J. Systems Research and Development Service.
OPERATION ACCORDION: NAVIGATIONAL ACCURACIES OF CIVIL JET AIRCRAFT OVER THE NORTH ATLANTIC, FEBRUARY 1962–SEPTEMBER 1963, VOLUME I Final Report
Irving Hirsch, Ronald Braff, and O. Marie Des Rosier Apr. 1964 454 p refs
(RD-64-52, I)

This report presents navigational accuracies over the North Atlantic during the period February 1962 through September 1963. The results are based upon data collected from approximately 5,000 Accordion designed civil jet flights of fourteen participant airlines. The measurements were made by four radars, viz., Gander, Goose, OSV Charlie, and Killard. In addition, considerable quantities of data were supplied by the airlines from Accordion flight logs. The administration of Operation Accordion comprised a condominium of the United States, the United Kingdom, and Canada. The primary purpose of the program was to provide information for decisions on current requirements for horizontal separation standards. Subordinate objectives included the procurement of information concerning the affects of different operational and external environments upon navigational accuracy. Author

N65-28778*# American Bosch Arma Corp., Garden City, N. Y.
MANUAL SPACE NAVIGATION COMPUTER STUDY
W. Blair Washington, NASA, Jul. 1965 131 p
(Contract NAS2-1477)
(NASA-CR-250) CFSTI: HC $4.00/MF $1.00 CSCL 17G

This report describes and evaluates the design and use of a simple manual space navigation computer. This computer is intended to provide backup guidance capability under abort conditions during an advanced manned space mission. A design study with an evaluation of the accuracy of the various components used in the computer is presented. A detailed accuracy analysis has been performed by simulation techniques. The overall accuracy of the manual space navigation computer is presented showing the results of the study for various abort trajectories. Significant relationships between accuracy and the operational usage of the manual computer have been developed. Author

N65-28857*# Hayes International Corp., Birmingham, Ala. Missile and Space Support Div.
VISUAL REQUIREMENTS BASED ON MINIMUM OBSTACLE AVOIDANCE DISTANCE
R. T. Heckman Huntsville, Ala., NASA. Marshall Space Flight Center, 30 Apr. 1965 24 p refs
(Contract NAS8-5307)
(NASA-CR-61078) CFSTI: HC $1.00/MF $0.50 CSCL 17G

This report is the result of studies to determine the minimum time and distance necessary for a vehicle utilizing two-wheel Ackermann steering to assume a path perpendicular to the original direction of travel. This human factors study was performed in order to define the visual requirements of the operator of a lunar surface vehicle for adequate maneuvering capabilities. Author

N65-28989# Federal Aviation Agency, Atlantic City, N. J. Systems Research and Development Service.
FEASIBILITY STUDY OF AIRBORNE TACAN INTERROGATOR MODIFICATIONS TO REDUCE FALSE SECTOR LOCK-ON Final Report
Bernard Weinstein, John Walls, Carl Trout, and Henry Hurley Jul. 1965 16 p
(RD-65-82)

Two circuit modifications were investigated for the reduction of false azimuth lock-ons in the TACAN navigation system. In modification No. 1, the 15-cps gate-width was limited to a maximum of ±10-degrees. This allowed the 15-cps error to be as much as ±10 degrees without causing any error to be indicated on the course deviation indicator (CDI). In modification No. 2, the 15-cps gate-width was limited to a maximum of ±20 degrees. This allowed the 15-cps error to be as much as ±20 degrees without causing the servo motor to go into the search condition. The modification No. 2 with a 40-degree gate would be compatible with present gate. The feasibility of a fix to prevent 40-degree false lock-ons due to noise signals was proven. Tests have shown that a solid-state modification kit could be incorporated within present airborne equipment. M.R.W.

N65-29006# Massachusetts Inst. of Tech., Cambridge. Instrumentation Lab.
INERTIAL NAVIGATION STUDY FOR CIVIL AIR TRANSPORT, PHASE I
W. B. Bryant, R. W. Simpson, and R. B. Trueblood Mar. 1965 136 p refs
(Contract FA-64-WA-5127)
(R-484; RD-65-36)

This report develops the application of inertial navigation and guidance systems to civil air transport operations from the systems engineering viewpoint. The concept of an operational system for navigation and guidance is introduced to facilitate consideration of the relationships which will exist between the inertial system and the operating functions necessary for the conduct of a flight. Inertial system configurations satisfying the requirements implied by these relationships are presented. The general requirements for input data panels and system output displays for all flight phases are discussed. Several basic navigation system mechanizations are analyzed and the general characteristics of a recommended configuration for an integrated navigation and guidance system described. The report also includes an estimate of the system performance required for the various flight phases. Author

N65-29030# Lear Siegler, Inc., Grand Rapids, Mich. Instrument Div.
HYPERBOLIC COORDINATE CONVERTER Final Report
W. F. Roth, A. R. VanKoevering, and D. Wozniak Jan. 1965 173 p refs
(Contract FA-WA-4659)
(SRDS-RD-65-3)

The development and construction of an airborne, digital, navigation computer for solving the coordinate conversion problem was proven as a result of an explicit solution to the coordinate conversion problem and some unique computing algorithms for solving trigonometric equations. The mathematical approach to the problem is developed and the algorithms are detailed in this report. The mechanization of the computer was a major breakthrough in digital computers and is now called DIVIC for *DI*gital *V*ariable *I*ncrement *C*omputer. This technique is completely outlined with a description of the resulting hardware. Author

N65-29040# Federal Aviation Agency, Washington, D. C. ATC Development Div.
SCHEDULED AIR CARRIER FLIGHT ACTIVITY IN THE UNITED STATES, MAY 1965 Interim Report, May 1965
Ellen S. Reynolds Jul. 1965 21 p
(RD-65-76)

The general flow of scheduled air carrier traffic for a typical Friday is plotted. In May 1965, community pairs exchanging a total of 100 or more flights were Los Angeles–San Francisco, Boston–New York, and Cleveland–Detroit. Total scheduled air carrier flights for May 1965 increased slightly more than 5% over November 1964. Total flights by piston and turboprop aircraft show a slight decrease over November 1964, while the number of flights by turbo-jet aircraft increased 3%.
Author

22 NUCLEAR ENGINEERING

Includes nuclear reactors and nuclear heat sources used for propulsion and auxiliary power. For basic research see: 24 Physics, Atomic, Molecular, and Nuclear. For related information see also: 03 Auxiliary Systems; and 28 Propulsion Systems.

N65-28129# Atomics International, Canoga Park, Calif.
DEVELOPMENT OF SPECIAL VIEWING AND PHOTOGRAPHIC EQUIPMENT FOR THE SRE REACTOR CORE
E. R. Meise 15 Jun. 1965 27 p refs
(Contract AT(11-1)-GEN-8)
(NAA-SR-10006) CFSTI: $0.75

The SRE is operated as a development and experimental facility. Between power runs and during some experimental programs it becomes necessary to view and photograph the interior of the SRE reactor core. This report describes a viewing device and special attachments that were designed and fabricated at the SRE site for core viewing and photography. Design objectives, design principles, pictures of the equipment, and pictures of the core interior are included.
Author

N65-28130# Oak Ridge National Lab., Tenn. Reactor Div.
A COMPARISON OF GAS-TURBINE AND STEAM-TURBINE POWER PLANTS FOR USE WITH ALL-CERAMIC GAS-COOLED REACTORS
A. P. Fraas and M. N. Ozisik Jul. 1965 82 p refs
(Contract W-7405-ENG-26)
(ORNL-3209) CFSTI: $3.00

This study compares gas turbines with steam turbines as a means of producing electric power from gas-cooled reactors with all-ceramic fuel elements. The first portion of the study was a parametric investigation of gas-turbine power plants to investigate the effects of regeneration, pressure losses in components, system pressure level, and system operating temperatures. A series of eight power plant configurations was investigated and compared from the standpoint of costs, hazards problems, and maintenance. The best of these configurations was then chosen, and a conceptual design of a gas-turbine plant was prepared. The features, problems, and costs of this plant were then compared with those of a comparable steam-turbine plant. The study indicates that a steam-turbine plant gives a higher thermal efficiency, lower initial capital charges, and substantially less-difficult maintenance problems than the gas-turbine plant.
Author

N65-28138 Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
ECONOMIC EVALUATION OF CLOSE-COUPLED FUEL PROCESSING WITH PLUTONIUM RECYCLE
R. W. Mc Kee Jan. 1965 77 p refs
(Contract AT(45-1)-1830)
(BNWL-28) CFSTI: $3.00

The relative fuel costs of two alternative reactor fuel cycles employing light water moderated reactors and either central plant reprocessing refabrication or close-coupled reprocessing refabrication were investigated. A typical water reactor with zirconium clad fuel, a typical water reactor with stainless steel clad fuel, and an advanced pressurized water reactor with stainless steel clad fuel were examined. Two fuel management concepts were considered: one with several reactors at a single site with staggered fuel discharges averaging 1 to 3 months between discharges, and the other, a single reactor discharging fuel at 12-month periods. One of the principle findings of the study was that the fuel exposure for a close-coupled plant cycle optimizes at 15000 to 20000 MWd/ton for an annual throughput of 40000 to 50000 kg/yr per 1000 MWe installed capacity. The most attractive prospects for close-coupled plutonium-recycle processing are relatively high enrichment reactors, such as a pressurized water reactor using stainless steel clad fuel.
E.E.B.

N65-28213# Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
SLOW NEUTRON SCATTERING STUDIES OF LIQUID AND SOLID ARGON
P. D. Randolph May 1965 20 p refs
(Contract AT(10-1)-205)
(IDO-17089) CFSTI: $1.00

Measurements with the Materials Testing Reactor phased-chopper velocity selector have been made of the slow neutron inelastic scattering from samples of liquid (88.7° K) and solid (82° K) argon. These measurements were made at incident neutron energies of 20, 40, and 100 meV for the liquid samples and at 20, 40, and 60 meV for the solid samples, and spanned a wave vector change κ from 2 to 14 $Å^{-1}$ for the liquid and from 1 to 11 $Å^{-1}$ for the solid. The scattering laws for the two phases show distinct momentum dependent coherent inelastic scattering such as has been observed previously in liquid Na and in polycrystalline Be and Al. A frequency spectrum of the normal modes of vibration has been obtained for the solid using the methods of Egelstaff. The spectrum, corrected for multiple phonon excitations, shows two small maxima at 4.7 and 6.9 meV, and has more low frequency modes than either a Debye spectrum or a second nearest neighbor, Born-von Karman spectrum.
Author

N65-28216# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
BATTELLE-NORTHWEST FUEL FABRICATION EXPERIENCE WITH HIGH-EXPOSURE PLUTONIUM
L. G. Merker, L. G. Faust, and W. J. Bailey Jan. 1965 52 p refs
(Contract AT(45-1)-1830)
(BNWL-27) CFSTI: $3.00

The radiation studies performed and the equipment and process modifications required to permit safe, routine, efficient handling of high-exposure plutonium are discussed. The surface dose rate of bare high-exposure plutonium (18 wt% Pu^{240}) was 2.5 to 3.5 times the rate for bare low-exposure plutonium (5.5 wt% Pu^{240}) when the time since separation for both metal specimens is on the order of 20 to 100 days. The dose rates from glove boxes where UO_2–PuO_2 is handled are one-half to one-fourth that of glove boxes where Al–Pu alloy, made from similar high-exposure Pu, is handled. This difference is attributed to the shielding provided by the uranium. In the case of Al–Pu alloys, where the plutonium contains 16 to 30 wt% Pu^{240}, the radiation levels are a factor of 5 to 10 higher than those from similar alloys made with low-exposure Pu. Typical

exposures for personnel handling low-exposure plutonium were 3.0 R/hr for the hands and 1.0 rem/yr for the body and for personnel handling high-exposure Pu, the exposure was 3.0 R/year for the hands and 0.75 rem/yr for the whole body. E.E.B.

N65-28218# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
BORONATED-GRAPHITE IRRADIATION STUDIES. FINAL REPORT OF IRRADIATION EXPERIMENTS CONDUCTED IN A HANFORD REACTOR
J. M. Davidson and L. O. Gates Jun. 1965 45 p refs
(Contract AT(45-1)-1830)
(BMWL-96) CFSTI: $2.00

Boronated graphites were irradiated at 370° C and 500° C to determine dimensional stability, strength, and other properties. The boronated graphites were nominally 5 and 7 wt% boron carbide in a nuclear-graphite matrix. The graphites were designated black and gray depending on the nature of the boron distribution. Except for the presence of boron-carbide particles, the structure of the black graphite was similar to that of normal nuclear graphite. The gray material, however, had a shiny metallic appearance because of extensive crystallization. Large differences were found in the behavior of the recrystallized gray material compared to the black material. Irradiation effects were more severe in the gray material. Length changes induced by neutron irradiation were generally positive, ranging up to 3% for the gray material. Compressive strengths were increased and thermal conductivities were lowered. No generalized fracturing was observed in any samples irradiated. E.E.B.

N65-28243# General Dynamics Corp., San Diego, Calif. General Atomic Div.
INVESTIGATION OF TURBOCIRCULATOR FOR TARGET, A 1000-Mw(e) REACTOR Summary Report
J. Yampolsky, V. Barbat, H. Berman, L. Cavallaro, F. Ross et al Washington, AEC, 28 Sep. 1964 130 p
(Contract AT(04-3)-167)
(GA-5559) CFSTI: $4.00

The feasibility determination, development program establishment, and the cost estimate for a turbocirculator to provide the pumping power for a 1000 MWe high-temperature gas-cooled reactor power plant are discussed. Methods are developed for the design optimization of the turbocirculator components. The thermodynamic analysis, turbocirculator preliminary design, turbocirculator stability and control, and the development program are included. E.E.B.

N65-28244# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
METALLURGY RESEARCH OPERATION Quarterly Progress Report, Jan.–Mar. 1965
J. J. Cadwell, T. K. Bierlein, A. L. Belmont, R. L. Dillon, and R. G. Wheeler 15 Apr. 1965 100 p refs
(Contract AT(45-1)-1830)
(BNWL-79) CFSTI: $4.00

Progress in the fields of *Physical Metallurgy; Reactor Metals Research; Chemical Metallurgy;* and *Materials Engineering* are reported. Radiation effects on metals; swelling of irradiated fissionable materials; plutonium physical metallurgy; and damage mechanisms are covered. Alloy Selection, in-reactor measurements of mechanical properties, irradiation facilities operation, irradiation damage to nickel-base alloys; and fracture studies are considered under *Reactor Metals Research.* The ATR gas loop support; N-reactor corrosion and hybriding; and production reactor corrosion and coating studies are discussed as *Chemical Metallurgy.* Gas loop development, PRTR pressure tubes, process tube development, N-reactor tube fracture, and the USA–AECL cooperative program are the *Materials Engineering* subjects covered. E.E.B.

N65-28711# Battelle Memorial Inst., Columbus, Ohio.
IRRADIATION OF SNAP SYSTEM ELECTRICAL DEVICES IN A HIGH-TEMPERATURE VACUUM ENVIRONMENT
Sam J. Basham, William J. Zielenbach, H. Thomas Gruber, and Joseph P. Allgeier 5 Apr. 1965 48 p
(Contract W-7405-ENG-92)
(BMI-X-10120)

A series of electrical devices was exposed to an integrated fast-neutron exposure of about 5 to 8 × 10^{18} n/cm^2 in a high-vacuum environment (< 10^{-5} torr) with specimen temperatures maintained at specified levels in the 650 to 1050 F range to obtain radiation-effects data for the Atomics International SNAP program. Nuclear environments were measured by extensive dosimetry. The electrical characteristics of the specimens were measured during the irradiation. Author

N65-28733# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
FISSION PRODUCT DISTRIBUTION IN IRRADIATED UO_2
J. L. Bates Mar. 1965 26 p refs
(Contract AT(45-1)-1830)
(BNWL-58) CFSTI: $2.00

The gross fission product relocation which occurs during high temperature irradiation of UO_2 fuel elements has been studied using autoradiography, microdrilling and radiochemical analysis. The fission product distribution is related to the characteristic microstructures of the UO_2 formed during irradiation. Annular bands of high fission fragment concentration are observed symmetrically about the thermal center with depletion in the large columnar grains. The distribution and concentration varies from fission product to fission product. Fission products concentrate in bands associated with metallic uranium inclusions that are formed during irradiation. Plutonium also migrates during irradiation. Author

N65-28789# Oak Ridge Operations Office, Tenn.
REVISIONS TO EXPERIMENTAL GAS COOLED REACTOR, VOLUME II: PLANT OPERATION Final Hazards Summary Report, Aug. 1, 1963
Jul. 1965 125 p
(ORO-606(Suppl. 1)) CFSTI: $4.00

Revised pages and figures are given for insertion into a hazards report pertinent to the safe operation of an experimental gas cooled reactor. In the complete report, plant organization, training, precritical shakedown tests, initial nuclear tests, power tests, normal and emergency plant operating procedures, periodic inspections, fuel handling, transportation, plant maintenance, and plant security are general areas covered. L.S.

N65-28790# General Motors Corp., Indianapolis, Ind. Allison Div.
MCR SMALL SOURCE EXPERIMENTS
R. Schamberger and J. Celnik 3 May 1965 93 p refs Shield Experiments Program Performed by United Nuclear Corp.
(Contract AT(30-1)-3078)
(GMAD-3078-28; EDR-4195; M-3679)

Shield experiments were performed to assess the analytical shield design techniques and cross sections for individual materials of interest in the Military Compact Reactor (MCR) shield,

with emphasis on the secondary gamma-ray production process in specific test materials. Measurements were performed for several configurations of three types of material (depleted uranium, tungsten alloy, and titanium hydride) as well as for a no sample configuration. These experiments provided a configuration in which the principal radiation measured was due to secondary gamma rays produced in the sample shielding materials. Calculations of the spectrometer response for one experimental configuration each of lead, tungsten, and titanium hydride were made with a three-dimensional Monte Carlo code derived from the one-dimensional Monte Carlo codes used in the MCR preliminary design shield analysis. Comparison showed that the calculations yielded spectrometer responses ranging from 50% to 80% of the measured values; where the differences exceeded 25%, cross section adjustments were revised upward
M.R.W

N65-28831# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
CERAMICS RESEARCH AND DEVELOPMENT Quarterly Report, Jan.–Mar., 1965
[1965] 126 p refs
(BNWL-91) CFSTI: $4.00

Progress in nuclear reactor ceramic fuel studies is reported under the major subdivisions of *Ceramic Fuel Research Studies; Irradiation Behavior of Ceramic Fuels; Plutonium Recycle Test Reactor (PRTR) Fuel Element Performance and Fabrication; Joint Fuel Development Programs;* and *Development of Advanced Fuel Concepts.* Among the specific investigations was the diffusion bonding of PuO_2–62 wt% (80 Ni-20Cr) cermet to 80Ni-20Cr foil by pneumatic impaction at 1093° C and 17 000 atm. No evidence was found of PuO_2 diffusion through 0.15 mm thick NiCr foil after heating at 1093° C for as long as 400 hr. A UO_2 capsule was irradiated to test the hypothesis that once-moulten UO_2 can solidify during continued irradiation because of improved thermal conductivity of the adjacent crystalline UO_2. Although the results are somewhat inconclusive, little change in the melt radius during 2 hr irradiation was indicated.
E.E.B.

N65-28835# European Atomic Energy Community, Brussels (Belgium).
FUNDAMENTAL METALLURGICAL STUDIES FOR THE IMPROVEMENT OF METALLIC URANIUM FUEL ELEMENTS
M. R. Bastelli, C. D'amato, G. C. Giacchetti, S. Granata, R. Renzoni (SNAM) et al Apr. 1965 15 p refs Presented at 3d Intern. Conf. on the Peaceful Uses of Atomic Energy, Geneva, 31 Aug.–9 Sep. 1964
(Contract EURATOM-001-62-6 TEGI)
(EUR-2215.e) Available from Belg. Am. Bank and Trust Co., New York, Account No. 22.186: 25 Belg. Fr.

The problem of improving metallic uranium fuel elements to obtain better fuel-cycle economy has been confronted in the SNAM-LRSR laboratories. To this purpose, particularly regarding the development of fuel elements for Latina-type and advanced graphite-moderated, gas cooled reactors, much work of a technological nature, as well as the necessary related fundamental research, has been carried out. This paper reviews the results deriving from the two different subjects upon which the greater part of the fundamental research effort has been spent. The first part of the paper concerns the study of uranium-rich niobium alloys while the second part, investigated in collaboration with the Metallurgical Department of CCR Ispra (Euratom), deals with the indirect bonding between the uranium fuel and the Magnox AL 80 can.
Author

N65-28858# Atomics International, Canoga Park, Calif.
THE EFFECT OF NEUTRON IRRADIATION ON THE LIQUID SODIUM DILATION OF GRAPHITE
D. L. Henry, K. T. Miller, and J. D. Stearns 30 Jun. 1965 28 p refs
(Contract AT(11-1)-GEN-8)
(NAA-SR-11309) CFSTI: $2.00

Unirradiated and irradiated graphite samples were exposed to sodium in the 600 to 1200° F temperature range. Expansion occurred in all samples; about 1% in the unirradiated graphite and from 2 to 5% in the irradiated graphite, depending upon the total neutron dosage. Some of this graphite had been irradiated up to 1.12×10^{21} nvt. Maximum expansion was found to occur in the direction normal to the extrusion axis of the graphite. Expansion in this direction exceeded that occurring in the direction parallel to the extrusion axis up to a factor of two. Lamellar compounds of sodium and graphite were not detected by X-ray diffraction but increases in c-spacing, up to 12%, were measured. The c-spacing change was attributed to random intercalation. The increase in c-spacing disappeared when the sodium-logged graphite was exposed to air, but the bulk expansion remained the same. Additions of potassium to the sodium, up to 0.1 wt % did not significantly affect the expansion of graphite in sodium.
Author

N65-28894# California Univ., Livermore. Lawrence Radiation Lab.
AGGREGATE PRODUCTION WITH NUCLEAR EXPOSIVES
Spenst M. Hansen and John Toman 12 May 1965 36 p refs
(Contract W-7405-ENG-48)
(UCRL-12180, Rev. 2) CFSTI: $2.00

Breaking rock with nuclear explosives for use as rough aggregate or as raw material for the manufacture of processed aggregate is now technically feasible. This capability was demonstrated by underground experiments in hard rock. Limitations arising from safety considerations are not excessive and will permit the use of nuclear explosives at many sites. The gross effects from underground nuclear explosions at various depths of burial for a given yield are summarized. The greatest potential for aggregate production is shown to exist at depths of burst deeper than normally used for explosive excavation. Under favorable circumstances, the total per unit cost of crushed stone from a nuclear explosion quarry, after sizing and all necessary processing, can be lower than the cost of a similar product produced by conventional methods.
E.E.B.

N65-28906# United Kingdom Atomic Energy Authority, Harwell (England). Research Group.
FLOW UP THE INNER TUBE OF A DIDO TYPE Mk. 3/2 FUEL ELEMENT
Katharine K. George Apr. 1965 25 p refs
(AERE-R-4891) HMSO: 3s 6d

The Mk. 3 fuel elements for the DIDO type Materials-Testing Reactors have a hollow core into which rigs may be inserted. Thimbles for containing the rigs form, with the inner tube of the fuel element, an annular channel up which travels a proportion of the total coolant flow supplied to the fuel element. It is found that with the standard entry cone fitted to the inner tube, the flow which passes up the inner tube is a constant proportion of the total flow supplied. The proportion is, however, dependent upon several other variables, and the report describes these and the extent of their effect. An appendix outlines the points to consider if a value of absolute flow is required. The work covers the use of a standard 2 1/8 in. diameter thimble only, and includes the effect of variation in diameter over the normal working tolerances. The only non-standard

effect treated is that of opening out the entry hole to the inner tube. The effect of complete removal of the thimble is included. Author

N65-28910# Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
STEP PROJECT Quarterly Technical Report, Jan. 1964–Mar. 1964, Apr. 1964–Jun. 1964
K. A. Dietz, ed. [1964] 225 p refs
(Contract AT(10-1)-205)
(IDO-17070) CFSTI: $6.00

Activities are reported on the safety test engineering program concerned with the transient and destructive testing of the beryllium reflected SNAPTRAN 2/10A-1 reactor and the water reflected SNAPTRAN 2/10A-3 reactor. Testing of the SNAPTRAN 2/10A-1 reactor was limited to a performance evaluation of the stepper and impulse drum drive units and a critical loading of the reactor. Data acquisition systems were installed, evaluated, and calibrated for the SNAPTRAN 2/10A-3 destructive test. The presentation and interpretation of the destructive test results are included. Progress in the loss of fluid test (LOFT) program included final selection of the test site and completion of the preliminary mechanical design of the reactor vessel and internals. Nuclear, heat transfer, and hydraulic studies; a blowdown analysis; and an investigation of the estimated contamination of the LOFT containment system and a radiological computer program for determining the inhalation doses were completed. R.N.A.

N65-28933# Los Alamos Scientific Lab., N. Mex.
PULSED NEUTRON ANALYSIS IN THE LOS ALAMOS COUPLED REACTOR EXPERIMENT
Curtis G. Chezem and Herbert H. Helmick 8 Jul. 1965 19 p refs
(Contract W-7405-ENG-36)
(LA-3263-MS) CFSTI: $1.00

A general kinetic model is derived to describe the time behavior of the neutron populations, $G_i(t)$, in each core of a lumped-parameter m-core array where Core No. 1 is pulsed. For a two-core array, the model yields:

$$G_1(t) = \sum_{i=1}^{4} A_i e^{R_i t} \text{ and } G_2(t) = \sum_{i=1}^{4} B_i e^{R_i t},$$

where the A_i and B_i are functions of the neutronic properties, coupling parameters and reactivity settings of the system, R_1 and R_2 are Rossi-α-like parameters "split" by the coupling effect, and R_3 and R_4 are "split" terms involving an interaction time lag. To test the kinetic model, one of the cores of a two-core array of Kiwi-B4 reactors was repetitively pulsed by a 14-Mev neutron pulse generator and the $G_i(t)$ were observed. Agreement between the experimental and theoretical impulse responses is quite good. The usefulness of the interaction time lag concept is questioned. Author

N65-28934# Atomic Energy Establishment, Winfrith (England). Technical Assessments and Services Div.
G.M.S.I.—A GENERALISED MULTIGROUP SYSTEM OF CALCULATIONS USING THE IBM 7030 (STRETCH) COMPUTER
C. P. Gratton and P. E. Smith Feb. 1965 27 p refs
(AEEW-M-458)

A generalized system of reactor physics calculations written in the Fortran programing language for the IBM 7030 is discussed. The program will perform cell, supercell, and overall reactor physics problems within the limits of one dimension using either slab or cylindrical geometry. A facility for the study of fuel burn-up was included with boundary conditions for either cell irradiations or the burn-up characteristics of the overall reactor. Particular attention was paid to the simplicity of the input to the program to allow a wide range of potential users, and extensive edit facilities were incorporated to allow a better understanding of the multigroup output. Also, a graphical output option is available. The logic of the program is written in terms of 40 neutron energy groups, the group boundaries of which may be selected by the user. E.E.B.

N65-28937# United Kingdom Atomic Energy Authority, Windscale (England).
A HIGH-ACTIVITY IODINE RELEASE FROM IRRADIATED FUEL AND ITS SUBSEQUENT CLEAN-UP
J. J. Hillary and J. C. Taylor [1965] 19 p refs
(TRG-888(W)) HMSO: 3s

A test at kilocurie level of activity has been performed, based on the most stringent conditions postulated in reactors of the advanced gas-cooled type and clean-up effected with a filter-charcoal bed-filter system. Iodine penetration of the treatment system was greater than previously experienced as a result of excessive loading of the charcoal bed by methyl iodide, produced from the iodine released by the fuel. Another type of charcoal has been found to give satisfactory retention of methyl iodide. Author

N65-28938# United Kingdom Atomic Energy Authority, Harwell (England).
THE PRESSURE RISE IN THE BIOLOGICAL SHIELD OF A SMALL SCALE MODEL OF A GAS COOLED REACTOR FOLLOWING A SIMULATED PRESSURE VESSEL FAILURE
F. J. Walford Apr. 1965 16 p refs
(AWRE-R-2165)

A model of a typical gas circuit and biological shield was constructed in which it was possible to simulate a failure of the reactor vessel. Measurements of the pressure distribution within the model following failure of the reactor vessel are reported as well as the measurements made when some of the model parameters were varied. Author

N65-28979# Joint Publications Research Service, Washington, D. C.
THE BN-350 ATOMIC POWER STATION
A. I. Leypunskiy et al 21 Jul. 1965 29 p Transl. into ENGLISH of the publ. At. Stantsiya BN-350 (USSR), Apr. 1965 p 1–30
(JPRS-31193; TT-65-31690) CFSTI: $2.00

The design characteristics and specifications of a high power, fast neutron, sodium cooled reactor are given in considerable detail. The active zone of 1500 mm diameter and 1060 mm in length is assembled from 211 hexahedral fuel packets of 169 fuel elements each placed in a triangular grid with a spacing of 7 mm. Each rod fuel element has an outer diameter of 6.1 mm with a 0.4 mm thick stainless steel shell. The core of plutonium and uranium dioxide has a fuel density of 10.5 g/cc with an average fuel density over the element volume of 8 g/cc. The active zone is surrounded by a 600 mm thick screen, including the sides and ends. Reactor control, safety, reloading, shielding, and heat removal systems are included. The electrical power of the station is rated at 350 000 kW. E.E.B.

N65-28985# Battelle Memorial Inst., Columbus, Ohio.
IRRADIATION EVALUATION OF Al_2O_3-COATED UO_2 FUEL PARTICLES
Neil E. Miller, Robert L. Ritzman, Robert L. Martin, and Charles W. Townley 16 Jun. 1965 24 p refs
(Contract W-7405-ENG-92)
(BMI-1729) CFSTI: $0.50

Effects of coating thickness, coating density, fuel-particle density, and fuel-particle diameter on behavior of Al_2O_3-coated UO_2 particles during irradiation at 100 to 1100° C were studied. Composite coatings of Al_2O_3 and BeO and/or pyrolytic carbon were also investigated. Where 40-μ Al_2O_3 coatings on dense UO_2 particles were found to fail in a few hours at 100° C, 60-μ composite coatings on dense UO_2, or 60-μ Al_2O_3 coatings on porous UO_2 particles showed no failure. At 815° C, 40-μ Al_2O_3 coatings on porous UO_2 particles showed no failure to high burnup, where similar coatings on dense UO_2 began to show some failure after a burnup of 2 a/o. At 1100° C the 40-μ coatings on dense UO_2 particles operated without failure to a burnup of over 10 a/o. Failure of Al_2O_3 coatings on UO_2 particles is believed to be caused by irradiation-damage-induced swelling of both the UO_2 particle and the inner layer of the Al_2O_3 coating. At elevated temperatures, annealing of the damage prolonged the life of the coatings. When particle swelling was reduced by using porous UO_2 and stronger coatings were produced by increasing their thicknesses, coating failure was eliminated. An optimum material of 60 μ of Al_2O_3 on 200-μ, porous UO_2 particles showed excellent performance at 100° C and withstood a burnup of over 10 a/o at 900° C. Diffusion of gaseous and solid fission products through Al_2O_3 coatings is sufficiently slow that release fractions can be maintained in the order of 10^{-6} or less when the coatings are intact. Author

N65-28992# Mound Lab., Miamisburg, Ohio.
REACTOR FUELS AND MATERIALS DEVELOPMENT PLUTONIUM RESEARCH Annual Report, 1964
L. J. Wittenberg and G. R. Grove 12 Jul. 1965 59 p refs
(Contract AT(33-1)-GEN-53)
(MLM-1244)

Phase diagrams are presented for the plutonium–cerium–nickel ternary system, plutonium–cerium–iron ternary system, and plutonium–cadmium binary system. Also, progress is reported on the phase studies of multicomponent plutonium alloys, plutonium–gallium alloys, plutonium–copper, cerium–copper, and plutonium–platinum alloys. Phase transformations in high-purity plutonium, latent heats of transformation in Pu–1%Ga alloy, structural studies of boron, and the development of differential thermal analysis are included. Research in the physical properties of reactor materials included thermal diffusivity measurements, densities of liquid metals, viscosities of liquid metals, and studies in thermodynamics. Investigations of plutonium-bearing ceramics covered plutonium dioxide microspheres, uranium dioxide microspheres, PuO_2–BeO microspheres, and submicron oxide particle research. E.E.B.

N65-29008# Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
POST-TEST PHYSICAL, CHEMICAL AND METALLURGICAL ANALYSIS OF SNAPTRAN-3 FUEL
R. D. Fletcher AEC Natl. Reactor Testing Station, Jun. 1965 73 p
(Contract AT(10-1)-205)
(IDO-17065) CFSTI: $3.00

The fuel element damage which occurred during the SNAPTRAN-3 Destructive Test of a Snap 10A/2 reactor is described. Chemical analysis of the fuel indicated that approximately 15% of the hydrogen was released and that the core flux was higher toward the center both radially and axially. Metallurgical analysis of the fuel determined the presence of the epsilon, delta, and gamma phases in the grain structure and evidence of a possible alpha or beta phase. The phase changes indicated a minimum peak fuel temperature of 1290° F while cracking at the grain boundaries indicated a peak fuel temperature in excess of 1740° F. The failed edges of the fuel cladding suggested a peak clad temperature in excess of 1000° F. Author

N65-29015# Bettis Atomic Power Lab., Pittsburgh, Pa.
PROPERTIES OF A HAFNIUM CONTROL ROD AFTER EXPOSURE DURING THREE SEED LIVES IN PWR CORE 1
G. J. Salvaggio, J. G. Weinberg, S. Kass, and K. J. Longua Jun. 1965 50 p refs
(Contract AT(11-1)-GEN-14)
(WAPD-TM-457) CFSTI: $3.00

A PWR Core 1 control rod irradiated to as high as approximately 6×10^{21} nvt (> 1 Mev) during three seed lives was destructively tested to determine the effect of irradiation on the properties of hafnium and to further assess the consequences of abnormal corrosion of weld joints of Zircaloy-2 welded to hafnium. Tests performed included hardness, tensile, fatigue, post-irradiation corrosion, chemical analysis, and metallographic examination. Results indicate that the strength increases as the square root of the fast neutron exposure with saturation effects occurring at high exposures for the room temperature strength but not at 300 or 600° F. The adequacy of the control rods for continued use is demonstrated by the apparent saturation of ductility decrease and the lack of further major changes in properties resulting from the corroded weld joints. Author

N65-29017# Atomics International, Canoga Park, Calif.
CALANDRIA CORE WELD JOINT DEVELOPMENT
J. G. Roberts 30 Jun. 1965 42 p refs
(Contract AT(11-1)-GEN-8)
(NAA-SR-9821) CFSTI: $1.25

With the advent of the large SGR suspended reactor with a calandria core containing a lattice work of process channels, it has become necessary to study and design methods for the installation, maintenance or replacement of the process channels. Thus, with regard to welded joints and machine parting characteristics, a development program was initiated to determine joint configuration and replacement processes. The design and initial test of cutting and welding equipment developed to remotely cut and reweld the bottom process tube joint are discussed in this report. The equipment to remotely cut and weld the upper process tube joint is in the process of manufacture and will be covered in a subsequent report. Author

N65-29026# Pratt and Whitney Aircraft, Middletown, Ohio.
DETERMINATION OF RELATIVE POWER DISTRIBUTIONS IN CANEL CRITICAL ASSEMBLIES USING CATCHER FOIL TECHNIQUES
W. F. Welsh 24 Feb. 1965 46 p refs
(Contract AT(30-1)-2789)
(PWAC-453) CFSTI: $2.00

Aluminum catcher foils, wrapped tightly against uncoated enriched uranium metal strips or blocks, are placed at those locations in a dry critical assembly at which the relative fission rate is to be determined. During operation of the assembly, some of the fission fragments from fissions occurring near the surface of the uranium leave that surface and become embedded in the aluminum catcher foils. The number of fission fragments which embed themselves in a catcher foil is directly proportional to the number of fissions near the contiguous surface of the uranium. The fission fragment deposition in a catcher foil is, therefore, directly proportional to the

power density at that location. After shutdown, the catcher foils are removed from the assembly and the gamma activity of the fission fragments embedded in each catcher foil is measured against that of a catcher foil located at the core center. A plot of these relative activities as a function of position within the assembly yields the relative power distribution.
Author

23 PHYSICS, GENERAL

Includes acoustics, cryogenics, mechanics, and optics. For astrophysics see: 30 Space Sciences. For geophysics and related information see also: 13 Geophysics; 20 Meteorology; and 29 Space Radiation.

N65-27998 Joint Publications Research Service, Washington, D. C.
ON CORRECTION OF MOTION OF A BODY WITH LIMITED FUEL RESERVE ON BOARD
V. A. Kolemayev *In its* News of the Acad. of Sci. USSR 9 Jul. 1965 p 260–264 refs (See N65-27975 17-34) CFSTI: $6.00

A model is considered for control of motion of a body subject to random noise effects for the purpose of maintaining the body for the largest possible time within given limits.
Author

N65-28050# Joint Publications Research Service, Washington, D. C.
ENGINEERING JOURNAL, VOLUME VI, NO. 2, 1965
29 Jun. 1965 295 p refs Transl. into ENGLISH from Inzh. Zh. (USSR), v. VI, no. 2, 1965 p 201–391
(JPRS-30855; TT-65-31376) CFSTI: $6.00

Studies on mechanics, fluid dynamics, and theory of elasticity and plasticity are reported. For individual titles see N65-28051–N65-28082.

N65-28051 Joint Publications Research Service, Washington, D. C.
ON THE EQUATIONS OF MOTION AND THE MEASUREMENT OF ANGLES OF ROTATION OF A FLIGHT VEHICLE MOVING NEAR THE VERTICAL PLANE
N. V. Kryuchkov *In its* Eng. J. 29 Jun. 1965 p 1–11 refs (See N65-28050 17-23) CFSTI: $6.00

Proposed is a method which employs the use of the pitch-yaw-roll system of rotation to eliminate singularities in the general equation of motion of a flight vehicle. Discussed is a method for deriving equations for small parameters of lateral motion, and a procedure for measuring the angles of rotation of the vehicle. Included are schemes for locating gyros which have the smallest errors in the measured values of the angles.
S.C.W.

N65-28052 Joint Publications Research Service, Washington, D. C.
ON THE STABILITY OF THE MOTION OF A GYROSCOPE ON A HORIZONTAL PLANE UNDER THE ACTION OF DRY SLIDING FRICTION
I. M. Mindlin *In its* Eng. J. 29 Jun. 1965 p 12–20 refs (See N65-28050 17-23) CFSTI: $6.00

Presented is a theoretical study on the stability of the stationary motion of a symmetric heavy gyro on a fixed horizontal plane in which its axis remains spinning. It is assumed that sliding is possible at the point of contact of the gyro with the plane, and that a dry friction force is developed. Considered is the action of viscous friction, and the motion of a top with the appearance of dry sliding friction which slightly deflects the top from the stationary motion present with movement over a smooth surface. Using expressions for the energy of two integrals known for the spherical surface, the validity of the stability condition is demonstrated.
S.C.W.

N65-28054 Joint Publications Research Service, Washington, D. C.
ELECTRICAL CONDUCTIVITY OF AIR IN THE TEMPERATURE RANGE FROM 1000 TO 20,000 K
R. M. Sevast'yanov and M. D. Zdunkevich *In its* Eng. J. 29 Jun. 1965 p 37–41 refs (See N65-28050 17-23) CFSTI: $6.00

In view of significant differences in published calculations of the electrical conductivity of air, a study was made to revise data in the temperature range from 1000° to 20000° K. Presented are data on the electrical conductivity of air with arbitrary degree of ionization, conductivity of a weakly ionized gas, and the conductivity of strongly ionized air. Equations were used to calculate the electrical conductivity of the air at temperatures below 3000° K, and a high-speed electronic computer for higher temperatures. Calculations were also made of the electrical conductivity of nitrogen and hydrogen in the temperature range from 5000° to 20000° K. Results were in good agreement with previously published data, however significant errors were found in theoretical values derived at lower temperatures.
S.C.W.

N65-28070 Joint Publications Research Service, Washington, D. C.
THE STABILITY OF THE MOTION OF AN UNBALANCED GYROSCOPE ON A ROTATING PLATFORM
A. I. Gurin *In its* Eng. J. 29 Jun. 1965 p 202–207 refs (See N65-28050 17-23) CFSTI: $6.00

Motion of an unbalanced symmetric gyroscope in a gimbal support, with spring restraints and horizontal outer gimbal axis, is studied mathematically. The gyro is assumed to be mounted on a platform which rotates about a fixed vertical axis. Equations of motion of the gyro, and an expression for the kinetic energy of the system, are derived. Conditions for asymptotic stability of the damped gyro are also determined.
J.M.D.

N65-28098*# Alabama Univ. Research Inst., Huntsville.
ON AXIOMS FOR HETEROGENEOUS CONTINUA
A. A. Hayday May 1965 26 p refs Work Prepared in part at Illinois Univ.
(Grant NsG-381; Contract Nonr-1858(25); Proj. Squid)
(NASA-CR-63787; UARI-23) CFSTI: HC $2.00/MF $0.50
CSCL 20M

The paper deals with the derivation of general conservation equations for heterogeneous continua—substances consisting of several distinct, possibly interacting constituents. The analysis, resting for the most part on an admissible superposition of the diffusive motions on the postulated motion of the mixture, is based on axioms in integral form from which the basic differential equations are deduced. The treatment is a rigorous, direct generalization of the classical theory for simple continua. The main results are compared with those of Truesdell and found to be in entire agreement.
Author

N65-28099*# Illinois Univ., Urbana. Dept. of Electrical Engineering.
PRINCIPLE OF SCALING IN A UNIAXIAL MEDIUM Scientific Report No. 6
C. P. Bates and R. Mittra Jun. 1965 30 p refs *Its* Antenna Lab. Rept.-65-12
(Grant NSG-395)
(NASA-CR-63783) CFSTI: HC $2.00/MF $0.50 CSCL 20N

Solution to Maxwell's equations is given for source currents in an unbounded magneto-ionic medium for which the dielectric tensor is uniaxial. Three-dimensional Fourier transforms technique is used because it gives the field solutions in a form which shows that the uniaxial fields may be obtained by a scaling of certain quantities. These quantities are related to fields in free space due to an equivalent source current. The choice of the quantities to be scaled and their respective equivalent source currents depend on how the uniaxial field solution is arranged. For example, two methods of scaling are given for the case of the source current perpendicular to the magnetostatic field. The problems of an electric dipole parallel and perpendicular to the magnetostatic field are given as examples of such scaling. Author

N65-28128# Rochester Univ., N. Y. Dept. of Physics and Astronomy.
ON THE SPHERICAL HARMONICS OF TWO SPHERES
Haim Goldberg 20 May 1965 9 p refs Submitted for Publication
(Contract AT(30-1)-875)
(UR-875-86)

The expression $\sum_{\alpha,\beta} Y^{a}_{\alpha}(e)\, Y^{b}_{\beta}(f)\, (a\alpha b\beta|\, abc\gamma) -$ where e and f are generic points on two independent unit spheres—is calculated in terms of variables which are more appropriate for the reflection of rotation-covariance. Author

N65-28186# RAND Corp., Santa Monica, Calif.
SOME MATHEMATICAL ASPECTS OF MULTIPLE SCATTERING IN A FINITE INHOMOGENEOUS SLAB WITH ANISOTROPIC SCATTERING
S. Veno, R. E. Kalaba, H. H. Kagiwada, and R. E. Bellman May 1965 22 p refs
(Contract AF 49(638)-700; Proj. RAND)
(RM-4595-PR; AD-615320)

The problem of radiative transfer in a finite inhomogeneous slab with anisotropic scattering is discussed. Some integro-differential equations with initial conditions are derived for the internal intensity, the source function, and the probability of photon emergence, with the aid of the invariant imbedding technique. These new equations are suitable for numerical computation with a large digital computer. Author

N65-28200*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
SATURN SOUND FOCUSING PREDICTION AT KSC
R. H. Burns and L. F. Keene 15 Mar. 1965 34 p refs
(NASA-TM-X-56614; NASA-SP-179; MTP-LVO-63-5) Supersedes MTP-LVO-63-5 CFSTI: HC $2.00/MF $0.50 CSCL 20A

This report is an analysis of the sound pressure level distribution during Saturn launchings as a function of atmospheric conditions. Means of determining such levels are developed and conclusions relating the differing sound pressure conditions between Huntsville, Alabama and Cape Kennedy to the differences between static and moving vehicles and in terrain are set forth. Author

N65-28215# Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
VIBRATING SYSTEMS AND FUNCTIONAL ANALYSIS. I: TYPICAL VIBRATING SYSTEMS. II: GENERAL THEORY
Bernard Friedman (Calif. Univ., Berkeley) Feb. 1965 37 p ref *Its* Math. Note No. 388
(DI-82-0407)

Some relatively new aspects of the relationship between the vibrating system and the linear operator are considered. The study begins with the simplest types of vibrating systems, namely, one mass on a spring, then two coupled masses, and finally a vibrating string. It is shown how the physical concepts of energy, normal modes and resonance arise in these cases. By analogy with these simple cases, a function space and certain linear operators which are related to the kinetic and potential energy are introduced. With these operators, the general equation of motion for a vibrating system is set up and it is shown how the spectral analysis of the relevant operators enables one to discuss the behavior of the system. Some simple examples which show that the classical theory of the spectrum of a linear operator may ignore some important aspects of the physical problem are considered. N.E.A.

N65-28271 Joint Publications Research Service, Washington, D. C.
INVESTIGATION OF A SYSTEM WITH WEAK DAMPING AND A SOFT FORCE DESCRIBED BY A THIRD-ORDER EQUATION
A. D. Maksimov *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 145–151 refs (See N65-28250 17-10) CFSTI: $5.00

Movement in a dynamic system with large deviations was investigated. Described are the conditions for the emergence of natural- and attenuating-oscillations. The asymptotic method was used to obtain solutions in the first approximation for the attenuating oscillations (aperiodic and oscillating components), and to establish the natural oscillations. Examined is the servo system of a radar tracking station. S.C.W.

N65-28274 Joint Publications Research Service, Washington, D. C.
METHOD OF CALCULATING LIGHT FILTERS FOR PHOTORESISTORS
A. S. Gridin *In its* Izv. VUZov: Instr. Bldg. 9 Jul. 1965 p 162–164 (See N65-28250 17-10) CFSTI: $5.00

Described is a method for calculating light filters which intercept short wave radiation. S.C.W.

N65-28329# Pennsylvania Univ., Philadelphia.
NON-THERMAL EFFECTS OF ALTERNATING ELECTRICAL FIELDS ON BIOLOGICAL STRUCTURES Technical Progress Report, Mar. 1, 1964–Feb. 29, 1965
Herman P. Schwan 13 May 1965 11 p refs
(Contract Nonr-551(52))
(AD-615661)

A theoretical investigation of the orienting effects of alternating electrical fields on nonspherical particles showed that a nonspherical particle imbedded in a medium with a different complex dielectric constant will be oriented by an alternating electrical field. The direction of stable orientation is determined by the geometry of the particle, by the dielectric properties of the materials, and by the frequency of the field. The stable orientation evoked by an alternating electric field is discussed for biological particle arbitrary shapes and compositions. Also, experimental studies of the time constant for pearl-chain formation were extended to measure the influence of particle size

and sub and supra-threshold electric field strengths. Pearl-chains transverse to the electric field vector were observed. The chains occurred concurrent with longitudinal pearl-chains. E.E.B.

N65-28336*# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Mechanical Engineering.
DISTRIBUTED PARAMETER TYPE OF CONTROL FOR A BILINEAR SYSTEM
C. N. Shen and T. C. Liu 15 Apr. 1965 28 p refs
(Grant NsG-14-59)
(NASA-CR-63801; AC-4) CFSTI: HC $2.00/MF $0.50

The optimum control laws for a bilinear system in distributed parameter model are analytically determined. Attempts are made to control the bilinear system in both the time and space domains using two consecutive optimization procedures. The bang-bang control is used for selecting the reference variables and the optimum feedback control is employed to adjust the system to approximately follow the reference variables under arbitrary starting conditions and disturbances. R.N.A.

N65-28340# New York Univ., N. Y. Div. of Electromagnetic Research.
HIGH-FREQUENCY SCATTERING BY AN IMPENETRABLE SPHERE
H. M. Nussenzveig Mar. 1965 118 p refs
(Contract AF 19(628)-3868)
(EM-203; AFCRL-65-256; AD-615755)

The scattering of a scalar plane wave by a totally reflecting sphere (hard-core potential) at high frequencies is treated by a modified Watson transformation. The behavior of the solution both in the near and far regions of space is discussed, as well as the accuracy and domain of applicability of the WKB approximation and classical diffraction theory. It is shown that different transformations are required in the forward and backward half-spaces, and corresponding integral representations for the primary wave are derived. The transformations are rigorously proved and the convergence of the residue series is discussed. In the shadow region, the physical interpretation of the complex angular momentum poles in terms of surface waves is in agreement with Keller's geometrical theory of diffraction. In the lit region, sufficiently far from the shadow boundary, the WKB expansion for the wave function is confirmed up to the second order. On the surface of the sphere, Kirchhoff's approximation is accurate, except in the penumbra region, where the behavior is described by Fock's function. The diffraction effects in the neighborhood of the shadow boundary are investigated and the corrections to classical diffraction theory are obtained. Author

N65-28348*# Wisconsin Univ., Madison. Theoretical Chemistry Inst.
SOME REMARKS ON THE STERNHEIMER POTENTIAL
Saul T. Epstein and John H. Karl 27 Apr. 1965 10 p refs
(Grant NsG-275-62)
(NASA-CR-63797; WIS-TCI-90) CFSTI: HC $1.00/MF $0.50 CSCL 20J

The definition of the Sternheimer potential is generalized to include wave functions which involve the spin. Author

N65-28349*# Virginia Univ., Charlottesville. Research Labs. for the Engineering Sciences.
DETERMINATION OF NEWTON'S GRAVITATIONAL CONSTANT, G, WITH IMPROVED PRECISION Status Report, Oct. 1, 1964–Mar. 31, 1965
J. W. Beams, A. R. Kuhlthau, R. A. Lowry, and H. M. Parker Jun. 1965 29 p refs
(Grant NgR-47-005-002)
(NASA-CR-63796; EP-4028-101-65U) CFSTI: HC $2.00/MF $0.50 CSCL 08N

The development of new techniques for the laboratory determination of the Newtonian gravitation constant with the expectation of improvement of the accuracy by about two orders of magnitude is discussed. In the determination of the gravitational constant, two small masses are connected by a rigid horizontal rod. These are then placed in proximity to another pair of masses, and the gravitational interaction between the two sets of masses results in a torque acting on the smaller mass system. A measure of this torque plus a knowledge of the separation distance determines G directly. Variations of this method such as inducing resonant torsional oscillations in the system by suitably driving the large mass system have been used. In the proposed method the gravitational torque is maintained constant by detecting changes in the relative angular position of the two mass systems and correcting the relative position by a servo mechanism to maintain the angular position constant. The ultimate measurement is one of determining the angular speed of the small mass system at the end of an extended period of time, i.e., of measuring large displacements and long times, both of which can be done accurately. E.E.B.

N65-28355# Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
ON NEWTON'S METHOD
A. A. Goldstein (Washington Univ.) Mar. 1965 10 p refs
Its Mathematical Note No. 403
(DI-82-0426)

In this note we discuss Newton's method in a setting somewhat more restrictive than customary. In this setting, however, we claim to have proved superlinear convergence of the Newton process without assuming twice differentiability of Lipschitz continuity of the first derivative of the operator. A further feature is that the iteration to be discussed is not initially but is eventually the Newton process. With this feature global rather than local convergence is achieved. Author

N65-28356# Florida Univ., Gainesville.
REPORT FROM THE WINTER INSTITUTE IN QUANTUM CHEMISTRY, SOLID-STATE PHYSICS, AND QUANTUM BIOLOGY AND THE INTERNATIONAL SYMPOSIUM ON ATOMIC AND MOLECULAR THEORY, DECEMBER 7, 1964–JANUARY 16, 1965. FIVE-YEARS PROGRESS REPORT FROM THE QUANTUM THEORY PROJECT, 1960–1965
Per-Olov Löwdin 1 Apr. 1965 71 p refs
(Rept.-67)

A survey of activities during the Winter Institute in Quantum Chemistry, Solid-State Physics, and Quantum Biology; and the International Symposium on Atomic and Molecular Quantum Theory is presented. An outline of the lecture subjects and a list of invited and contributed papers are given. The research project, graduate program, computational program, international exchange program, and winter institutes of the quantum theory project are reviewed. Research progress concerned with the mathematical and conceptual structure of modern quantum theory and its application to atomic and molecular structure, solid-state physics, and quantum biology is reported. R.N.A.

N65-28472# National Aerospace Lab., Tokyo (Japan).
ON THE CONVERGENCE OF GALERKIN'S METHOD
Ryozo Toriumi 1965 23 p refs In JAPANESE; ENGLISH summary
(NAL-TR-77)

The convergence of Galerkin's method is studied for the Dirichlet problem of linear elliptic partial differential equations and for the initial-boundary value problem of linear parabolic partial differential equations. We show that these problems may be dealt with as linear equations in Hilbert space by extended operators; the generalized Dirichlet problem and the abstract initial value problem respectively. In the former, a proof for the convergence of Galerkin's method, which is not based on symmetricity, is presented. In the latter, a modified Galerkin's method and a proof for its convergence are presented. Author

N65-28536# Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
ON THE ELASTIC MODULI OF SOME HETEROGENEOUS MATERIALS
Bernard Budiansky Mar. 1965 10 p refs
(Contract Nonr-1866(02))
(TR-22; AD-615345)

A heuristic analysis is given for the determination of the elastic moduli of a composite material, the several constituents of which are each isotropic and elastic. The results are intended to apply to heterogeneous materials composed of contiguous, more-or-less spherical grains of each of the phases. Author

N65-28547# Joint Publications Research Service, Washington, D. C.
DECREASING THE NOISE LEVEL OF CENTRIFUGAL VENTILATORS
G. A. Khoroshev and Yu. I. Petrov 16 Jul. 1965 8 p refs Transl. into ENGLISH from Sudostroyeniye (Leningrad), no. 3, 3 Mar. 1965 p 15–17 refs
(JPRS-31116; TT-65-31614) CFSTI: $1.00

A method for reducing the noise level in centrifugal ventilators (fans) is developed. The noise is caused by the aerodynamic force, created by the irregularity of the distribution of air-flow velocities beyond the rotor wheel, acting on the leading edge of the shell tongue. Application of a skewed or slanting tongue increases the pressure head and efficiency of the ventilator and reduces the noise level. A simplified formula for determining the angle of inclination of the tongue is given. M.R.W.

N65-28599# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ABOUT THE STABILITY OF MOTION OF A GYROSCOPIC PENDULUM
V. F. Lyashenko 19 Apr. 1965 8 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Otd. Tekhn. Nauk: Mekhan i Mashinostr. (Moscow), no. 4, 1963 p 3–6
(FTD-TT-64-1175/1; AD-615228)

Discussion is held on the Shuler gyroscopic pendulum. The first integral of equations of motion of a gyro pendulum is formulated, and used for the obtainment of sufficient stability conditions of an imperturbed movement of the system. Author

N65-28611# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SOUND ABSORBING AND INSULATING DEVICES IN AVIATION
Andrzej Rudiuk 5 May 1965 14 p Transl. into ENGLISH from Tech. Lotnicza (Poland), no. 4, 1964 p 103–106
(FTD-TT-64-1353/1+2; AD-464206)

The sources of aircraft noise and ways of eliminating it through fuselage insulation are discussed. The effective noise absorbing quality and methods of improving it are discussed for a number of insulation systems. Examples of insulating systems used in existing aircrafts are given. Efforts to reduce the noise level in a proposed aircraft through antivibration layers and perforated plates are discussed. N.E.A.

N65-28647# Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
A STATISTICAL THEORY OF WORK-HARDENING
U. F. Knocks 22 Mar. 1965 57 p refs
(Contract Nonr-1866(27))
(AD-614662)

The consequences of a random distribution of obstacles to the movement of dislocations are examined. Firstly, it is proven that a critical applied stress exists; it is determined by a critical value of the fraction of passable obstacles such that the average dislocation segment can keep moving. There is thus no limit to the expandability of a convex dislocation loop; however, the moving dislocation leaves debris behind in the form of concave loops around areas surrounded entirely by impassable obstacles. The rate of this primary dislocation storage with strain, if one considers monopoles only, is very low and again depends on the critical fraction of passable obstacles only, not on any properties of the distribution, i.e. not on the arrangement of dislocations. The absence of large-scale regularity in the obstacle structure alone (whatever the nature of the obstacles may be) can thus explain "stage II" hardening which is characterized by a value of about 1/300 of the shear modulus, independent of all conceivable parameters within wide limits. The structure of the work-hardened crystal, thus derived in a semi-phenomenological way, also offers itself for appealing mechanistic interpretations of more complicated phenomena such as latent hardening, dynamic recovery, and some metallographic observations. Author

N65-28715# California Univ., Livermore. Lawrence Radiation Lab.
PHYSICS DEPARTMENT PROGRESS REPORT, JULY–SEPTEMBER 1964
A. Lorenz, ed. [1965] 73 p refs
(Contract W-7405-ENG-48)
(UCRL-12204) CFSTI: $3.00

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2. THERMODYNAMIC PROPERTIES OF MATTER H. M. Schey et al p 27–48 refs
3. FLUID AND HYDRODYNAMICS R. Grover et al p 48–59 refs
4. RADIATION PHYSICS J. A. Fleck, Jr. et al p 60–65 refs

N65-28721# Rochester Univ., N. Y. Inst. of Optics.
OPTICAL LENS SYSTEMS DESIGN FORMULAE FOR HIGH SPEED COMPUTERS Quarterly Status Report

Robert E. Hopkins 31 Dec. 1964 14 p
(Contract DA-30-069-AMC-534(A))
(QSR-3; AD-614901)

The following areas of work are to be covered: (1) Improve and extend the optical design features in ORDEALS; (2) study the effects of glass choice, with particular emphasis on secondary color; (3) study three and four element objectives in order to pin point regions of solution; and (4) refine a program which makes drawings of optical components as viewed from any desired vantage point. Author

N65-28736*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE J-2 ENGINE AS AN ACOUSTICAL NOISE SOURCE
Richard N. Tedrick, Charles C. Thornton, and Wade D. Dorland 3 Feb. 1965 43 p refs
(NASA-TM-X-53199) CFSTI: HC $2.00/MF $0.50 CSCL 20A

In the development of the Saturn family of space vehicles, increasing emphasis has been placed upon the operating acoustic environments, because of the increased engineering effort required to design structures and facilities for existence in these environments. As a result, a large number of programs have been initiated to measure the acoustical properties of such engine configurations. However, these usually describe only a very small class of rocket systems-propellants of liquid oxygen and kerosene. The J-2 engine however operates on liquid oxygen–hydrogen propellants and has slightly higher specific impulse and exhaust nozzle exit velocity. The static firings of the J-2 engine were monitored acoustically. It was found that the J-2 was quite similar in acoustic output to the H-1 engine, despite some differences in operating parameters between the two. The acoustic output was found to be about 2.5 million watts with the frequency peaking in the 63 Hertz octave. Author

N65-28746# Ohio State Univ. Research Foundation, Columbus.
N.M.R. STUDIES OF SOLIDIFIED H_2–D_2 MIXTURES. I: STEADY-STATE EXPERIMENTS
J. G. Daunt, J. R. Gaines, and E. M. de Castro Apr. 1965 47 p refs
(Contract Nonr-495(20))
(TR-15; AD-614809)

Steady state NMR measurements using a marginal oscillator technique at 10 Mc/sec have been made on solid mixtures of nH_2–nD_2 of nH_2 concentration from 100% to 1% in the temperature range 1.1° K to about 12° K. Striking differences in the line shape were observed, particularly in the n-D_2 rich sample, with change in temperature, the line shape at the lowest temperatures revealed a composite structure. Narrowing of the resonance lines with increasing r.f. power was observed. This narrowing is in excellent agreement with a recent calculation by Provotorov and his theory is used to obtain a value of the exchange interaction in solid H_2 of approximately 10^{-7}K. The progressive saturation technique is used to obtain values of the product T_1T_2 for several of the mixtures. The data showed that T_1T_2 has a value of 4.2° K of about 2×10^{-6} sec^2 for concentrations of nH_2 from 10% to 100%. Author

N65-28837 Army Materials Research Agency, Watertown, Mass. Materials Engineering Div.
STRAIN-ENERGY RATES FOR A CLASS OF PERTURBATIONS OF BOUNDARY GEOMETRIES
Oscar L. Bowie Jan. 1965 11 p refs
(AMRA-TR-65-01; AD-614567)

An argument of Irwin is formalized and extended within the framework of linear elasticity for the change in strain energy associated with a class of perturbations of boundary geometry. Application of the argument to the calculation of the rate of change of the elastic strain energy for a family of edge notches in tensile sheet is then demonstrated. Author

N65-28859# California Univ., Livermore. Lawrence Radiation Lab.
WIGNER'S ANALYSIS OF THE UNITARY REPRESENTATIONS OF THE POINCARE GROUP
Francis R. Halpern and Elbert Branscomb Feb. 1965 62 p refs
(Contract W-7405-ENG-48)
(UCRL-12359) CFSTI: $3.00

An exposition of Wigner's analysis of the irreducible unitary representations of the inhomogeneous Lorentz group is presented including the calculation of sevéral useful matrices and the detailed consideration of the structure of the various little groups and their representations. The theory of induced representations and little groups is briefly discussed in an appendix because it is the basis for Wigner's analysis and is of general applicability. Author

N65-28907# European Organization for Nuclear Research, Geneva (Switzerland).
THE ELEMENTARY THEORY OF LANDAU DAMPING
H. G. Hereward 28 May 1965 53 p refs
(CERN-65-20)

Calculations are given for exponentially decaying solutions of resonant spectrums associated with Landau damping. Various artificial spectra are constructed to illustrate the types of phenomena that can occur. Useful insight is obtained from the calculations into such problems as (1) where the energy in a conservative Landau-damped system goes; (2) justification of an answer that is not time-symmetrical to a problem that apparently is time-symmetrical, and (3) the limits of the linear approximation. L.S.

N65-28936# United Kingdom Atomic Energy Authority, Culham (England). Culham Lab.
A SINGLE LOOP CONDUCTOR FOR PRODUCING A MAGNETIC WELL
F. M. Larkin Jun. 1965 17 p refs
(CLM-R-37)

The report describes a single loop conductor, shaped like the seam on a tennis ball, which generates the simplest type of magnetic well. Some contours of constant field strength are presented, for a number of variations on the standard case, which illustrate the possible range of mirror ratios. Also a preliminary study indicates that an efficiency of at least 60% may be achieved in the Lorentz trapping of injected neutral atoms. Author

N65-28947# Advanced Kinetics, Inc., Costa Mesa, Calif.
STUDIES ON THE INTERACTION OF LIGHT AND PARTICLE BEAMS Final Technical Report, 1 Aug. 1964–28 Feb. 1965
5 Mar. 1965 25p refs
(Contract AF 49(638)-1359)
(AFOSR/65-0492; AD-614790)

The Faraday effect at optical frequencies was investigated in magnetic fields up to 400 000 oersteds. The investigation has resulted in the determination of the Verdet coefficients for 10 optical media at lambda = 6328A. The experiment

was conducted by means of a DC excited helium–neon laser operated in a hemispherical configuration and with transient magnetic fields provided by a 10 kilojoule bank. This investigation has established the practicality of optical rotators and switches of modest dimensions, low absorption, wide wavelength coverage extending into the far infrared. The effect of localized evaporation induced in minute particles by an impinging beam of coherent radiation has been calculated. The expected recoil velocities as generated by the beam pressure compounded by the evaporation process have been determined and the acceleration of the macroscopic particles was evaluated for a given duration of the vaporization process. Terminal velocities in excess of 100000 cm/sec could be expected for masses of the order of 10^{-11} power grams, or more, and diameters in the order of 10 to 100 microns with energy densities in the field of a few joules/cu cm. TAB

N65-28965# RAND Corp., Santa Monica, Calif.
NUMERICAL RESULTS FOR CHANDRASEKHAR'S X AND Y FUNCTIONS OF RADIATIVE TRANSFER
R. Bellman, H. Kagiwada, R. Kalaba, and Sueo Veno Apr. 1965 34 p refs
(Contract AF 49(638)-700; Proj. RAND)
(RM-4531-PR; AD-614635)

From many points of view the X and Y functions of Chandrasekhar may be considered to be the basic functions of radiative transfer. In this memorandum the authors present graphs of these functions covering wide ranges of slab thicknesses and albedos for single scattering. The tables on which the graphs are based were obtained by numerically integrating the integro-differential equations satisfied by the X and Y functions. One of the great advantages of such graphs and tables is that one can test the accuracy of simple approximate expressions. Author

N65-28971# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHOD OF SIMULATING ACOUSTIC PROCESSES IN ENCLOSED SPACES
B. G. Belkin 29 Apr. 1965 6 p Transl. into ENGLISH from Soviet Patent No. 161527 (Appl. No. 830212/26-10, 10 Apr. 1963) 3 p
(FTD-TT-64-1294/1+2; AD-615253)

A method of simulating acoustic processes in enclosed spaces with the aid of supersonic signals emitted and received in a reduced model of an investigated space is described. For the purpose of narrowing the frequency range, a low frequency signal is converted into a supersonic one by separating it into a low frequency and a high frequency. The low frequency is changed into supersonics by the transposition of the spectrum upwards in accordance with the scale of the model by recording it on a magnetic tape. The high frequency is changed by amplitude modulation of the sinusoidal oscillation of some high frequency and subsequent separating and emission in the model of one lateral band of modulated oscillation. R.N.A.

N65-29001# Texas Nuclear Corp., Austin.
A STUDY OF FLUORESCENT EXCITATION USING ISOTOPIC X-RAY EMISSION
Troy C. Martin and Kenneth R. Blake 31 Mar. 1965 61 p refs
(Contract AT(40-1)-3224)
(ORO-627) CFSTI: $3.00

Some of the factors affecting the sensitivity of the isotopic X-ray fluorescent technique of elemental analysis have been studied. These include matrix or inter-element effects and in more detail the source geometry and the low energy X-ray absorption in air and in the spectrometer window. It was found by using a gas proportional counter with a 0.5 mil beryllium window in a helium atmosphere that fluorescent X-rays as low in energy as 1 keV could be detected. An increased efficiency of a factor of 30 for 1 keV X-rays in helium compared to air was obtained. In addition it was determined that by using a different source geometry, the sensitivity could be increased by an order of magnitude over the conventional source-on-window geometry normally employed in isotopic fluorescent analysis work. With a donut source geometry a calibration curve was obtained for sulfur in powdered graphite in the range of from 0.1% to 10% by weight with good statistical accuracy. Author

N65-29013# General Dynamics/Astronautics, San Diego, Calif.
AN APPLICATION OF THE COOLING CURVE METHOD TO THE MEASUREMENT OF SPECIFIC HEAT OF PLASTICS AND COMPOSITES
G. L. O'Barr, James F. Haskins, M. D. Campbell, and G. E. Pynchon 21 Dec. 1964 28 p refs
(GDA-ERR-AN-594)

A cooling curve method of measuring specific heat has been developed to obtain specific heat data for solid materials at cryogenic temperatures. Description of the apparatus and techniques associated with this method, and a discussion of results, are presented. Based upon extensive analysis and experience in the cooling curve method, several improvements and advances in designs are proposed that will improve the accuracy, speed, and flexibility of the present method. Author

N65-29062# Lockheed Missiles and Space Co., Sunnyvale, Calif.
ON THE CORRECTION OF THE MOTION OF BODIES WITH A LIMITED STORE OF FUEL ON BOARD
V. A. Kolemaev [1965] 4 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Tekhn. Kibern., (USSR), no. 2, 1965 p 188–190

The equations of motion are considered for a body subjected to the effect of random interference in order to sustain the body for the longest possible time under given limits. It is assumed that the body moves at constant speed along the t axis in the (t,x) plane and that random interference exerts influence on the body in the x direction so that the coordinate $x = x(t)$ at time t is a random process with independent increments as a function of t. Because of the central limit theorem, this is considered a Gaussian process. In order to eliminate the influence of the interference, the body is allowed to perform a maneuver with velocity v along the x axis. A solution is derived for the situation in which units of fuel are expended per unit time. E.E.B.

N65-29066 European Organization for Nuclear Research, Geneva (Switzerland).
A SYSTEM TO DETECT SEVERAL SPARKS IN A SONIC SPARK CHAMBER
D. Freytag, A. J. Smith, and G. Laverrière 24 May 1965 26 p refs
(CERN-65-19)

A sonic detection system for the reconstruction of several sparks occurring simultaneously in a spark chamber has been developed and tested. Up to four sparks could be resolved in a single gap, using four microphones and detecting in each microphone the successive signals from the different sparks. The resolving power for double sparks was 25 mm, the accuracy of reconstruction about 1 mm for an active area of the spark chamber of 1.30×0.80 m^2. The efficiency of reconstruction for double spark events was 80% unambiguous reconstructions

in a single gap using four microphones. Including events showing added ambiguous spark locations the efficiency for double spark events was (94 ± 4)%. For three spark events only 20% of all events could be resolved unambiguously while a further 35% showed added ambiguous spark locations. In the remaining events one or more spark locations were lost (6% for two-spark events, 45% for three-spark events). Author

N65-29113# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CALCULATION OF FIELDS OF MAGNETIC HEADS ON AN ELECTRONIC COMPUTER
N. G. Zagoruyko and V. I. Rozenberg 13 Apr. 1965 31 p refs Transl. into ENGLISH from Sibirsk. Otd. Inst. Mat. (Novosibirsk), 1961 p 2–33
(FTD-TT-64-852/1+2; AD-614945)

The paper deals with the calculation of magnetic dissipation fields in the head gap used in magnetic signal recording on a wire carrier. The algorithms and the special features of the programs utilized for the solution of such problems on an electronic computer are described. The results of the field calculations are analyzed; on the basis of these results the effect is studied which the various parameters of the head, carrier and signal have on the recording characteristics, in particular on such a specific type of distortion as the "twisting effect" (misalignment effect). The paper is of interest to specialists in the domain of magnetic field calculations and in the domain of magnetic signal-recording. Author

24 PHYSICS, ATOMIC, MOLECULAR, AND NUCLEAR

Includes atomic, molecular, and nuclear physics. For applications see: 22 Nuclear Engineering. For related information see also: 29 Space Radiation.

N65-28025* Miami Univ., Coral Gables, Fla.
SYMMETRY PRINCIPLES AT HIGH ENERGY
Behram Kursunoglu, Arnold Perlmutter, and Ismail Sakmar, ed. San Francisco, W. H. Freeman and Co., 1965 454 p refs Presented at the Coral Gables 2d Conf. on Symmetry Principles at High Energy, 20–22 Jan. 1965; Sponsored jointly with NASA, AEC, AFOSR, NSF
(Grant NGR-10-007-015)
(NASA-CR-63788) CSCL 20H

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10. INTRINSICALLY BROKEN U(6) × U(6) SYMMETRY FOR STRONG INTERACTIONS K. Bardakci, J. M. Cornwall, P. G. O. Freund, and B. W. Lee (Inst. for Advanced Study) p 260–272 refs (See N65-28035 17-24)

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12. THE PRESENT STATUS OF VERY HIGH ENERGY p+p, p+p, $\pi^{\pm}$+p AND $K^{\pm}$+p SCATTERING S. J. Lindenbaum (Brookhaven Natl. Lab.) p 287–329 refs (See N65-28037 17-24)

13. THE PROBLEM OF GROUP EXTENSIONS OF THE POINCARE GROUP AND SU(6) SYMMETRY L. Michel (Inst. des Hautes Etudes Sci.) p 331–352 refs (See N65-28038 17-24)

14. A PHENOMENOLOGICAL APPROACH TO RELATIVISTIC SU(6) THEORY B. Sakita (Argonne Natl. Lab.) p 354–360 (See N65-28039 17-24)

15. U(12) AND TIME REVERSAL VIOLATION IN THE WEAK INTERACTIONS F. Zachariasen and G. Zweig (Calif. Inst. of Tech.) p 362–370 refs (See N65-28040 17-24)

16. PHENOMENOLOGICAL FIELD THEORY J. Schwinger (Harvard Univ.) p 372–378 (See N65-28041 17-24)

17. A MODEL FOR PC VIOLATION IN THE FRAMEWORK OF UNITARY SYMMETRY B. d'Espagnat and M. K. Gaillard (Lab. de Phys. Theorique et des Hautes Energies) p 380–400 (See N65-28042 17-24)

18. BEYOND $SU(3)^{+}$ Y. Ne'eman (Calif. Inst. of Tech.) p 402–436 refs (See N65-28043 17-24)

N65-28026* Institute for Advanced Study Princeton, N. J.
REMARKS ON SYMMETRY PRINCIPLES
J. Robert Oppenheimer *In* Miami Univ. Symmetry Principles at High Energy 1965 p 2–4 (See N65-28025 17-24)

The use of SU(6) as an approximate quasi-static symmetry which can be successfully applied to a large class of subjects is considered. Two points, which go beyond previously published material, are mentioned. One is the application of SU(6) to the forward elastic scattering amplitudes and, therefore, to the total cross sections; the other is related to some of the accurate partial width results obtained in SU(6) symmetry. The connection of symmetries to bootstraps is also discussed for SU(2), SU(3), and SU(6). A bootstrap is expected when a characteristic vector of the crossing matrix is found; this matrix always has real elements, its square is unity, and it has eigenvectors. In general, more than one eigenvector is shown, and

the one favored by nature is the one which has the fewest channels working and the fewest particles contributing. It is mentioned that this finding gives certain results which explain why bootstraps work, even though it does not solve the dynamical problem. M.W.R.

N65-28027* International Centre for Theoretical Physics Trieste (Italy).
THE COVARIANT THEORY OF STRONG INTERACTION SYMMETRIES
Abdus Salam (Imp. Coll. of Sci. and Technol.) *In* Miami Univ. Symmetry Principles at High Energy 1965 p 6–32 refs (See N65-28025 17-24)

An S-matrix approach is used to find a covariant generalization of the U(6) structure, which was discovered in 1964 as a symmetry of strong interaction physics. Solutions are presented for the problem of constructing fully-covariant, many particle states, and the relevant S-matrix elements. The generalization of the symmetry from U(6) to $\bar{U}(12)$, and subgroups of the latter are discussed. Reduction of $\bar{U}(4)$ to the homogeneous Lorentz group L_4 is considered with examples, as are the inhomogeneous Lorentz group and the final expressions for the form factors. M.W.R.

N65-28028* California Univ., Berkeley.
EXPERIMENTAL STUDY OF MULTIPARTICLES RESONANCE DECAYS
Gerson Goldhaber *In* Miami Univ. Symmetry Principles at High Energy 1965 p 34–126 refs (See N65-28025 17-24)

Multiparticle resonance decay and various enhancements are considered. Cases have been observed in which a resonance decays into a second resonance or particle through a two-step process; the final states deal with at least four particles, and frequently the multiparticle resonance is produced peripherally. The status of some of the resonance states which give rise to multiparticle decay is reviewed, and some unsolved problems in particle physics are considered. The feature of the ρ meson and the ρ puzzle are also discussed. M.W.R.

N65-28029* Syracuse Univ., New York.
QUESTION OF COMBINING INTERNAL SYMMETRIES AND LORENTZ GROUP
E. C. G. Sudarshan *In* Miami Univ. Symmetry Principles at High Energy 1965 p 147–158 refs (See N65-28025 17-24)

The advancing group theory front is discussed in terms of the Poincare group and the theoretical appearance of regularities going beyond the group. Such regularities arise in connection with the covariant description of relativistic particles. In the particle spectrum, further regularities are associated with additional invariance properties. These identifications are usually with Lie groups, are generally expected to apply to only strong interactions, and are viewed as internal symmetries. A scheme of symmetries, which involves mutually commuting Poincaré and internal symmetry groups, does not specify space–time properties or multiplet structure. These limitations could be overcome by appeal to dynamical notions. Other topics considered include: relativistic spin-dependent symmetry groups, vector currents and particle multiplets, McGlinn's theorem and its sequel, and the mathematical structure of symmetry algebras and O'Raifeartaigh's classification. M.W.R.

N65-28030* Miami Univ., Coral Gables, Fla.
SYMMETRY AND STRONG INTERACTION
Behram Kursunoglu *In its* Conf. on Symmetry Principles at High Energy 1965 p 160–177 refs (See N65-28025 17-24)

The Poincaré group, the invariance group of electrodynamics which contains translations in time and space, are considered valid symmetry operations for strong interactions whether or not there are other interactions. However, the Poincaré group is not the only invariance group of hadrons, and as the range of interactions decreases additional symmetries arise. It is emphasized that in the absence of a unified theory, electromagnetic and weak interaction will still break the symmetry in the usual way. The possibility of some connection between internal and space–time symmetries is considered. The extended relativistic 16 parameter group $L\bar{U}(4)$ are discussed, and the 16 operators are defined to provide an irreducible unitary representation of $L\bar{U}(4)$. It is shown that the component of the generators of $L\bar{U}(12)$, when commutation rules are calculated, yield the commutation rules of the subgroup $L\bar{U}(4)$. Commutation rules for $L\bar{U}(12)$ are detailed. M.W.R.

N65-28031* California Inst. of Tech., Pasadena.
WEAK AND ELECTROMAGNETIC CURRENTS AND STRONG INTERACTIONS SYMMETRIES IN THE BOOTSTRAP PROGRAM
Roger Dashen *In* Miami Univ. Symmetry Principles at High Energy 1965 p 179–200 refs (See N65-28025 17-24) (Contract AT(11-1)-68)

A heuristic approach is taken to a discussion of strong interactions symmetries in a bootstrap theory in which the weak and electromagnetic currents of the hadrons should satisfy self-containing conditions which may essentially determine the structure of the currents. It is also argued that the set of currents which is allowed in a bootstrap theory is closed under commutation and can, therefore, be used to form a Lie algebra which ought to be a natural symmetry of the strong interactions. It is shown how a bootstrap theory could lead to a class of self-consistent currents, some of which would presumably be used by the weak and electromagnetic interactions of the hadrons. The algebraic properties of self-consistent curents are then considered, and a physical model is offered to show a close connection between symmetries and self-consistent currents. M.W.R.

N65-28032* Weizmann Inst. of Science, Rehovoth (Israel).
TESTS OF UNITARY SYMMETRY AND POSSIBLE HIGHER SYMMETRIES
Harry J. Lipkin *In* Miami Univ. Symmetry Principles at High Energy 1965 p 202–217 refs (See N65-28025 17-24)

Selection rules are presented which may be considered as experimental indications for the existence of a symmetry higher than unitary to provide some insight into the underlying dynamical theory. These selection rules cannot be described by a new additive conserved quantity, since the number of these quantities defined by any Lie group is given by the rank of the group. Thus SU(3), whose rank is two, already accounts for two known quantities, namely electric charge and hypercharge. Any higher symmetry described by a Lie group of rank greater than two defines new additive quantum numbers and predicts selection rules which may disagree with experiment. This difficulty can be avoided by either classifying all known particles as having a zero eigenvalue or as non-eigenstates of the new additive quantum number. The former can be considered as a superstrangeness type of higher symmetry, which encounters difficulties in its failure to find a mechanism for inhibiting the production of superstrange particles without seriously breaking the symmetry. Higher symmetry theories in which physical particles are not eigenstrates show some promise of avoiding difficulties with selection rules. M.W.R.

N65-28033* Northwestern Univ., Evanston, Ill.
MESON DECAYS AND THE SIGMA HYPOTHESIS
Laurie M. Brown and Harry Faier. *In* Miami Univ. Symmetry Principles at High Energy 1965 p 219–248 refs (See N65-28025 17-24)

Current evidence for the sigma hypothesis in meson decays is reviewed. Strong, weak, and electromagnetic decays, and various decay spectra are considered. It is concluded that the decay spectra and branching ratios of the meson decays, $\eta \rightarrow 3\pi$, $K \rightarrow 3\pi$, and X^0 (960) $\rightarrow \eta 2\pi$, all appear to be consistent with the final state dominance of a scalar sigma meson having $I = 0$, mass about 400 MeV, and width about 100 MeV.
M.W.R.

N65-28034* California Inst. of Tech., Pasadena.
ROLE OF NON-COMPACT GROUPS
Yuval Ne'eman *In* Miami Univ. Symmetry Principles at High Energy 1965 p 250–258 refs (See N65-28025 17-24)
(Contract AT(11-1)-68)

Noncompact groups were first used to allow for the existence of an orbital part to the rest-angular momentum of a physical particle in some higher representation. An application currently under study has centered upon the band obtained from bootstraps by adding a meson every time. Connected to this is an attempt at a symmetry-equivalent to the bootstrap idea that no hadron is elementary. It is pointed out that much of the work is at the early guessing stage.
M.W.R.

N65-28035* Institute for Advanced Study, Princeton, N. J.
INTRINSICALLY BROKEN U(6)X U(6) SYMMETRY FOR STRONG INTERACTIONS
K. Bardakci, J. M. Cornwall, P. G. O. Freund, and B. W. Lee *In* Miami Univ. Symmetry Principles at High Energy 1965 p 260–272 refs (See N65-28025 17-24) CSCL 20H

In an effort to extend the SU(6) symmetry to relativistic quantum theory, a chain of symmetries was produced, culminating in $W_6 = U(6) \otimes U(6)$. This chain arises naturally in extending the essentially non-relativistic SU(6) symmetry to relativistic field theory. The symmetry will usually show up only in the interaction term and will make sense in terms of a strong coupling limit. Quarks and four-fermion interactions are used as a guide in searching for possible symmetries. It is shown how the nonrelativistic results predicted by SU(6) can be obtained from W_6. A possible interpretation of U(6) invariance of strong interactions in relativistic quantum theory, and a way of extracting physical consequences from this interpretation are shown.
M.W.R.

N65-28036* Chicago Univ., Ill.
DYNAMICAL SYMMETRIES AND FUNDAMENTAL FIELDS
Y. Nambu *In* Miami Univ. Symmetry Principles at High Energy 1965 p 274–285 refs (See N65-28025 17-24) CSCL 20H

The absence of the fundamental triplet representation among the known particles and resonances of the SU(3) symmetry is noted, and fundamental triplets are discussed in this light. The problem of stabilizing the charm zero states (baryons) against other possible states is considered in a purely dynamic and qualitative manner. Meson states and many-baryon states can be treated as a mass difference between the triplets, and/or as another field coupled to the baryon number. The implications of SU(6) symmetry are also considered. An extreme nonrelativistic model of baryons is presented, whose energy levels are primarily determined by the spatial configuration. The triplets are much heavier than the baryons, and there is near cancellation between potential and kinetic energy. For the model, the triplets and all $C \neq 0$ states are supposed to be very massive and, in general, will quickly decay via weak interactions.
M.W.R.

N65-28037* Brookhaven National Lab., Upton, N. Y.
THE PRESENT STATUS OF VERY HIGH ENERGY p+p, $\bar{p}$ + p, $\pi^{\pm}$ + p AND $K^{\pm}$ + p SCATTERING
S. J. Lindenbaum *In* Miami Univ. Symmetry Principles at High Energy 1965 p 287–293 refs (See N65-28025 17-24)

High energy elastic scattering as small $|t| \rightarrow 0$ as well as scattering at higher incident momenta, $|t| \geq 0.2$, are considered. A summary of small angle p + p scattering results is presented in tabular form, and polarization experiments and charge exchange scattering are discussed. The scattering amplitudes in $\pi^{\pm}$ + p scattering at small $|t|$ have shown sizeable negative parts in the 8–12 BeV/c region, and these parts tend to disappear or change sign in the 20–24 BeV/c region. In the case of p + p, similar real amplitudes exist if spin independence is assumed. Although the error is large, it has been reasonably well established that at higher energies (~ 25 BeV) p + p expands, K^+ + p shrinks, but K^- + p shows no evidence for shrinkage.
M.W.R.

N65-28038* Institut des Hautes Etudes Scientifiques, Paris (France).
THE PROBLEM OF GROUP EXTENSIONS OF THE POINCARE GROUP AND SU(6) SYMMETRY
Louis Michel *In* Miami Univ. Symmetry Principles at High Energy 1965 p 331–352 refs (See N65-28025 17-24)

Group extensions of the Poincaré group (P) and application to relativistic SU(6) symmetry are considered in terms of simple concepts in group theory, relativistic invariance, and mathematical results on extensions of P. In applying group extensions to SU(6) symmetry, topics discussed include physical interpretation for the extension of P, the group of invariance of Wigner's supermultiplet theory, and possible group of invariance of a relativistic SU(6) theory. A scheme is mentioned to transform the invariance group of Wigner's nonrelativistic supermultiplet theory without sending space–time into a larger Lie group invariance is only a pale reflection of a deep invariance under an infinite parameter Lie group. Relativity introduces a kinematical spin–orbit coupling which can be handled by pure group theoretical techniques, and recent SU(6) theory seems to indicate that once these space–spin kinematical correlations have been taken into account, the dynamics appears rather spin–unitary spin independent.
M.W.R.

N65-28039* Argonne National Lab., Ill.
A PHENOMENOLOGICAL APPROACH TO RELATIVISTIC SU(6) THEORY
B. Sakita *In* Miami Univ. Symmetry Principles at High Energy 1965 p 354–360 (See N65-28025 17-24)

In taking a phenomenological approach to a relativistic SU(6) theory, the elementary particle field is considered the product of component fields which are spinors of SL(6,C) as well as of large group M(12) or U(12). It is assumed that the interaction Lagrangian is invariant under SL(6,C) or M(12); by adding the free Lagrangian, M(12) can be broken and the fields can be quantized. Procedures for describing the meson and baryon fields are given. It is emphasized that particle nature in a multiplet is determined not only by the M(12) tensorial nature of the field but also by the structure of the free wave equation. The fields of the Lagrangian interaction, which is treated as a lowest order perturbation, are replaced by solutions of the free wave equation.
M.W.R.

N65-28040* California Inst. of Tech., Pasadena.
U(12) AND TIME REVERSAL VIOLATION IN THE WEAK INTERACTIONS
F. Zachariasen and G. Zweig *In* Miami Univ. Symmetry Principles at High Energy 1965 p 362–370 refs (See N65-28025 17-24)
(Contract AT(11-1)-68)

Two U(8) subgroups of U(12) are considered pertinent symmetries for weak interactions. While it is stated that there is no a priori reason to believe that there is a relationship between weak and strong interaction, the conserved vector current theory and its experimental verification indicate that there may be some connection. Some of the consequences of such a theory are considered, namely: (1) time reversal is violated only in the parity changing part of nonleptonic decays; (2) the violation of time reversal leads to a branching ratio which can be compared with the experimental value; (3) hyperon nonleptonic decays should exhibit a 2% time violating effect; (4) the T conserving $\Delta S = 0$ weak interaction amplitudes satisfy an approximate $\Delta I = 0$ rule; and (5) the vector-coupling constant for nonstrangeness changing β-decays is not G, but G cos θ = 0.98G. M.W.R.

N65-28041* Harvard Univ., Cambridge, Mass.
PHENOMENOLOGICAL FIELD THEORY
Julian Schwinger *In* Miami Univ. Symmetry Principles at High Energy 1965 p 372–378 (See N65-28025 17-24)

An indirect procedure for establishing a limited connection between the postulated attributes of fundamental field variables and the properties of the phenomenological fields that represent observed particles is outlined. Dynamical assumptions are presented for application to the effect of the kinematical transformation group U(12). It is assumed that the transformations of the group induce predominantly local transformations on the independent dynamical variables of the unreduced phenomenological baryon and meson fields; the transformations are represented linearly by the various components of these fields. Correspondence between fundamental and phenomenological fields is considered, and constraint equations are given which determine the dependent fields in terms of the independent fields. A compact transformation group has been exploited as a device for conveying dynamical information of an essentially localized nature, referring to the construction of phenomenological fields from fundamental fields. M.W.R.

N65-28042* Laboratoire de Physique Theorique et des Hautes Energies, Orsay (France).
A MODEL FOR PC VIOLATION IN THE FRAMEWORK OF UNITARY SYMMETRY
B. d'Espagnat and M. K. Gaillard *In* Miami Univ. Symmetry Principles at High Energy 1965 p 380–400 (See N65-28025 17-24)

Two approaches are presented in order to deal with expected PC violations in weak interactions and, in particular, the smallness of the observed effect in K_2^0 decay. First, an elementary description of the construction of weak currents and application to leptonic decays of strange particles is given and a comparison is made with predictions of Cabbibo's version of a PC violation. A more formal approach is also developed, wherein both leptonic and nonleptonic interactions are described. Three possible interpretations for the smallness of the $K_2 \to 2_\pi$ branching ratio are given: (1) the angular parameters are very small ($\sim 10^{-3}$); (2) these parameters are appreciable ($\leq 6°$), and, as for any theory where PC violation is large, the smallness of the observed effect must be considered accidental. This is possible if the relevant matrix elements happen to contribute equally to the rate of decay as well as to the off-diagonal element of the kaon mass matrix; (3) angle δ is fairly large ($\leq 45°$) and angles ϕ and $\theta \leq 10^{-3}$, and the same considerations hold as in (2). M.W.R.

N65-28043* California Inst. of Tech., Pasadena.
BEYOND SU(3)$^+$
Yuval Ne'eman *In* Miami Univ. Symmetry Principles at High Energy 1965 p 402–436 refs (See N65-28025 17-24)
(Contract AT(11-1)-68)

A general review of the symmetry approach to particle physics is offered, and SU(3) assignments are discussed in light of the experimental situation. Transformation properties of the various symmetries, found with the aid of bootstrap methods, offer a unified picture of octet enhancement. Suggestions are offered with respect to a protosymmetry larger than SU(3) which is still parity retaining. Chiral symmetries where the endosymmetry is extended to include parity are also discussed, and the CP riddle is mentioned. Mixed symmetries, spin extension of SU(3) and the nature of SU(6) symmetry, and Lorentz extensions of SU(3) and the Poincare group are considered. Finally, the role of noncompact groups and their possible connection with the bootstrap philosophy are discussed. M.W.R.

N65-28126# California Univ., Berkeley. Lawrence Radiation Lab.
DATA ON PARTICLES AND RESONANT STATES
Arthur H. Rosenfeld, Angela Barbaro-Galtieri, Walter H. Barkas, Pierre L. Bastien, Janos Kirz et al Mar. 1965 39 p refs
(Contract W-7405-ENG-48)
(UCRL-8030, Pt. I) CFSTI: $2.00

Data are summarized and tabulated for the stable leptons, mesons, and baryons including mass differences and magnetic moments. Also, data are summarized and tabulated for the unstable particles including information on what pion and kaon beams will form certain resonances. Since the available particle-spectro-scoptic data are rapidly increasing, the process has been automated so that data-averaging can be performed by computer. E.E.B.

N65-28162# RAND Corp., Santa Monica, Calif.
ANALYTICAL AND COMPUTATIONAL TECHNIQUES FOR MULTIPLE SCATTERING IN INHOMOGENEOUS FINITE SLABS
R. E. Bellman, H. H. Kagiwada, R. E. Kalaba, and Sueo Ueno Jan. 1965 21 p refs
(Contract AF 49(638)-700; Proj. RAND)
(AD-68-PR; AD-610555)

Some basic variables and functions naturally arising in the problem of multiple scattering in inhomogeneous finite slabs are investigated. Various quantities associated with the internal diffuse radiation fields, source functions, and probabilities of photon emergence are introduced and their interconnections are deduced both physically and mathematically. The Fredholm resolvent is used to determine the integro-differential equations for the photon emergence probability in a finite isotropically scattering flat layer of arbitrary stratification. Several integro-differential equations for Chandrasdkhar's X and Y functions are found, taking into consideration the polarity of the radiation. R.N.A.

N65-28210# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ESTIMATION OF THE SCALE PARAMETER OF THE GAMMA DISTRIBUTION BY USE OF M ORDER STATISTICS
Richard Alan Bruce (M.S. Thesis) Aug. 1964 142 p refs
(GRE-MATH-64-2; AD-610768)

A technique is developed for estimating the scale parameter of a Gamma distribution with known shape parameter using m order statistics. Basic properties of the Gamma distribution and certain theoretical concepts of order statistics are presented. A linear unbiased minimum variance estimate can be computed by applying tabulated multiplying factors to the first m ordered observations. Multiplying factors which yield one-order-statistic estimates are also tabled. Two efficiencies for the one-order-statistic estimators are given: the first is based on the m-order-statistic estimator and the second is based on the maximum likelihood estimator. Table ranges include shape parameters $\alpha = 1(1)3$ for sample sizes $n = 1(1)20$ and $\alpha = 4(1)6$ for $n = 1(1)15$. Author

N65-28247# Los Alamos Scientific Lab., N. Mex.
POLARIZATION AND ELASTIC SCATTERING OF PROTONS AND NEUTRONS FROM NUCLIDES Bibliography, Jan. 1958–Dec. 1961
R. V. Winsor 28 Jun. 1965 57 p refs
(Contract W-7405-ENG-36)
(LA-3281-MS; UC-34) CFSTI: $3.00

N65-28375 European Organization for Nuclear Research, Geneva (Switzerland). Nuclear Physics Div.
Vth INTERNATIONAL CONFERENCE ON NUCLEAR PHOTOGRAPHY, VOLUME II
E. Dahl-Jensen, ed. Jan. 1965 556 p refs Proc. of Conf. held at CERN, Geneva, 15–18 Sep. 1964 In FRENCH and ENGLISH
(CERN-65-4, Vol. II)

Nuclear photography conference papers are presented on nuclear tracks in solid state detectors, latent image formation, preparation of emulsions, properties of emulsions, processing of emulsions, spurious scattering, automation of measurements in emulsions, range, ionization and multiple scattering parameters in emulsions, and applications of emulsions. For individual titles see N65-28376–N65-28444.

N65-28376 Centre de Recherches Nucléaires, Strasbourg (France). Dept. de Physique Corpusculaire.
RECORDINGS OF INDIVIDUAL DIVERSE SOLID MATERIALS [ENREGISTREMENTS DE TRACES INDIVIDUELLES DANS DIVERS MATERIAUX SOLIDES]
Monique Debeauvais *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 8 p refs In FRENCH (See N65-28375 17-24)

Conditions favoring the recording of alpha particle traces were studied experimentally in various nitrocellulose materials; of particular interest was the commercial celluloid which consists of nitrocellulose with a camphor plasticizer. It was found that the number of recorded traces will increase with leaching time up to a maximum value, beyond which the trace will disappear with possible destruction of the polymer. Also, the increase in trace gage was studied as a function of developing time, and the recording and conservation of traces were evaluated for a range of process temperatures. All the investigated nitrocellulose materials demonstrated usefulness as detectors of low energy alpha particles. Further increase in the sensitivity of these materials will be difficult. Trans. by J.M.D.

N65-28378 Commissariat à l'Energie Atomique, Fontenay-aux-Roses (France).
DOSIMETRY OF SLOW NEUTRONS BY RECORDING THE FISSION TRACKS IN THE INSULATORS [DOSIMETRIE DE NEUTRONS LENTS PAR ENREGISTREMENT DES TRACES DE FISSION DANS LES ISOLANTS]
J. Mory and R. M. Walker (Gen. Elec. Co., Schenectady, N. Y.) *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 8 p refs In FRENCH (See N65-28375 17-24)

A chemical method for determining the number of fission particle traces in material irradiated by slow neutrons is presented. The method is based on the fact that after the irradiated material is leached by an appropriate solution, the traces remain as empty channels through the material. The leached material is placed in an electrolytic cell; the resistance of the cell will then depend upon the number of channels, i.e. the number of traces. Thus, the number of traces is deduced experimentally from measurements of cell resistance. The method is illustrated in application to mica and to a plastic compound, with hydrofluoric acid and soda as the respective leaching agents. Trans. by J.M.D.

N65-28379 Centre de Recherches Nucléaires, Strasbourg (France). Dept. de Physique Corpusculaire.
DECORATION OF THE TRACKS OF CHARGED PARTICLES IN SINGLE-CRYSTALS OF SILVER CHLORIDE [DECORATION DES TRACES DE PARTICULES CHARGEES DANS DES MONOCRISTAUX DE CHLORURE D'ARGENT]
L. Bilwes-Girardin and R. Schmitt *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 5 p In FRENCH (See N65-28375 17-24)

A method for detecting traces of alpha particles in irradiated monocrystals is described, and results of its use with silver chloride crystals are presented. The crystals are first exposed to proton irradiation, and afterward are annealed, cooled, and cleaned. The traces then are decorated by exposure to the illumination of a mercury lamp, and are observed under an optical microscope with the aid of polarized light. Varying degrees of success were obtained with crystals from different manufacturers. In some cases good trace decoration was observed, while in other instances the presence of crystal dislocations—which themselves were decorated—was a complicating factor. It appears that manifestation of decorated traces is different on the surfaces than in the crystal mass. Numerous technical problems are discussed which remain to be solved in perfecting this technique. Trans. by J.M.D.

N65-28380 AGFA-Gevaert, A. G., Leverkusen (West Germany). Wissenschaftliches Lab.
INVESTIGATIONS ON THE TOPOGRAPHY OF THE LATENT IMAGE
E. Moisar *In* CERN, Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 10 p refs (See N65-28375 17-24)

An investigation of latent formation in chemically not-ripened, homodisperse AgBr-emulsions was performed on different exposures. It was shown that a p_{Ag}-decrease encourages internal latent image formation. The topography and dispersity of the latent image varies according to the intensity and the duration of the exposure. In primitive AgBr emulsions an even distribution of latent image specks throughout the grain was obtained after low intensity light exposure. Particle and short light exposure lead to a preferential formation of a surface image and the absence of an internal image. This effect was due to a depletion of the grain volume of interstitial silver ions. Solarization appeared after particle exposure, when the exposure was carried out in such a manner that each grain was hit by a sequence of particles. The dispersity of the latent image corresponds to the one after a short light exposure. R.W.H.

N65-28381 Academia R. P. R., Bucharest (Rumania). Inst. of Nuclear Physics.
ON THE RELATIVE DISPERSION OF THE LATENT IMAGE [SUR LA DISPERSION RELATIVE DE L'IMAGE LATENTE]
M. Nicolae *In* CERN, Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 6 p ref In FRENCH (See N65-28375 17-24)

The method of redox potentials for development of images was used in studying the relative dispersion of the latent images under the action of alpha particles, electrons, and illumination. Emulsions were exposed to light by a sensitometer, to electrons from cesium-137 and ruthenium-106, and to alpha particles through contact with uranium oxide. The darkenings in the developed images were evaluated to determine optical density, and the results are discussed from the point of view of chemical kinetics and the relationship between the dimensions of the center of development and its autocatalytic action. The analysis indicates that the degree of dispersion of the centers of the latent images is determined by the nature of the radiation and the sensitivity of the emulsion. Trans. by J.M.D.

N65-28382 Kernforschungsanlage, Juelich (West Germany).
DIFFERENTIATION BY ELECTRONIC MICROSCOPE OF EMULSIONS OF DIVERSE ORIGINS HAVING UNDERGONE IRRADIATIONS α OR β [DIFFERENCIATION AU MICROSCOPE ELECTRONIQUE D'EMULSIONS D'ORIGINES DIVERSES AYANT SUBI DES IRRADIATIONS α OU β
G. Riedel *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 2 p In FRENCH (See N65-28375 17-24)

Sensitivity and resolution was evaluated in three different photographic emulsions subjected to nuclear radiation. In study of the developed samples, sensitivity was determined on the basis of the number of silver grains in the traces of alpha and beta particles, and resolution was investigated in the form of trace magnitude. Two different developers were used in these tests. Difficulties in preparing emulsions of consistent quality are discussed. Trans. by J.M.D.

N65-28383 NIKFI Inst., Moscow (USSR).
METHOD FOR INCREASING THE STABILITY OF SENSITIVITY AND LATENT IMAGE OF NUCLEAR EMULSIONS
C. M. Romanovskaya, C. S. Bogomolov, and M. Yu. Deberdeev *In* CERN. Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 10 p refs (See N65-28375 17-24)

The storage of emulsion layers capable of recording minimum ionization particles under low humidity and high temperatures are under study. Emulsion layers subjected to additional vacuum drying were maintained at temperatures of 36°, 43°, 50°, 60°, 80°, and 120° C. Test results showed that high-temperature prewarmed emulsion layers possess higher photographic stability characteristics. Fog grain background variation during the storage of warmed-up emulsion layers was of the same order as in usual (unwarmed) R-1 Type layers. Inquiry was made into the photosensitivity and the fog change stability in the course of chemical ripening of R NIKFI Type emulsion. The chemical ripening temperatures were 36°, 46°, and 60° C. Chemical ripening kinetics of high sensitive R NIKFI Type nuclear emulsion displays, at least, two features: a slower sensitivity fall with time beyond the maximum point, and the absence of steep fog growth. R.W.H.

N65-28384 Centre de Recherches Nucléaires, Strasbourg (France). Dept. de Physique Corpusculaire.
LATENSIFICATION OF THE LATENT IMAGE IN IONOGRAPHIC EMULSIONS [LATENSIFICATION DE L'IMAGE LATENTE DANS LES EMULSIONS IONOGRAPHIQUES]
R. Schmitt, R. Demoulin, and L. Bilwes *In* CERN, Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 14 p refs In FRENCH (See N65-28375 17-24)

The effect of a second exposure of long duration and low intensity in reinforcing latent images (latensification) was evaluated experimentally. Sample ionographic emulsions were subjected either to alpha and beta irradiation or to accelerated protons, and the second exposure was accomplished by means of sensitive monochromatic radiation. The results show a continuity between the latensification and the Herschel effect. A maximum latensification was observed for each of the monochromatic illuminations tested in post-exposure of the emulsions, and the value of the maximum decreased in passing from ultraviolet to ultrared. Reinforcement by latensification of the image was found to be comparable to the use of a brief light when the difference in energy imparted to the particles by the two methods is taken into account. Trans. by J.M.D.

N65-28385 Belgrade Univ. (Yugoslavia). Inst. of Physics.
THE SENSITIVITY CENTRES AND LATENT IMAGE DISTRIBUTION AS FACTORS OF NUCLEAR EMULSION PROPERTIES
B. Zizić and J. Vuković *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 6 p refs (See N65-28375 17-24)

The effect of active impurities on AgBr microcrystals to synthesize ultrafine ionographic high-sensitivity emulsions were investigated. It was shown that foreign ions as impurities, present at the end of emulsification and during the first digestion, form sensitivity centers in emulsion microcrystals. The best results were given by $S^{=}$, $Se^{=}$ and $Te^{=}$. The sensitivity centers formed under the effect of foreign impurities increase the efficiency of gold sensitization, providing a uniform growth of sensitivity specks during chemical digestion. It was also shown that additional crystallization of emulsions and distribution of sensitivity specks can be regulated. A homogeneous fine-grain ionographic emulsion, in which relativistic electrons with 44 grains per 100 microns, were obtained. R.W.H.

N65-28386 European Organization for Nuclear Research, Geneva (Switzerland).
A STUDY OF THRESHOLD OXIDATION AND DEVELOPMENT OF LATENT IMAGE FORMED BY CHARGED PARTICLES IN NUCLEAR EMULSIONS
N. P. Kocherov *In its* Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 14 p refs (See N65-28375 17-24)

The influence of the size of haloid silver grains and gold concentration in the emulsion of the value ΔE_{min} and the relationship between the characteristics of charged particle tracks and the magnitude of the ox-red potential of the developer are presented. For processing the emulsions the systems of ferric-ferrous iron were used. The measurements of the ox-red potential of the solutions were made by a platinum electrode in relation to the saturated calomel electrode. It was demonstrated that there was a substantial change in the threshold potentials of oxidation and development of latent image centers. There was a possibility that gold in the form of gelatinates was absorbed on the surface of the emulsion microcrystals, and on exposure was reduced to metal and entered the latent image centers. Upon the introduction of gold into an emulsion there appeared a wide range of equivalent potential in which neither development nor oxidation took place. R.W.H.

N65-28387 European Organization for Nuclear Research, Geneva (Switzerland).

ON THE SENSITIVITY AND DEVELOPMENT CENTERS OF INSENSITIVE NUCLEAR EMULSION [SUR LES CENTRES DE SENSIBILITE ET LES CENTRES DE DEVELOPEMENT DE L'EMULSION NUCLEAIRE NONSENSIBILISEE]

D. M. Samoylovich *In its* Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 10 p refs In FRENCH (See N65-28375 17-24)

In the present work we studied the process of increasing the sensitivity of nonsensitized emulsions, and found a dependance of the sensitivity limit as a function of conditions of chemical maturation. The results are compared with previous data for emulsions sensitized by gold and an attempt is made to evaluate the magnitude of the centers of sensitivity and the centers of the latent image. The experiment was conducted on nonammoniated emulsions, for which the formulas and method of synthesis are explained in detail. Trans. by J.M.D.

N65-28388 European Organization for Nuclear Research, Geneva (Switzerland).

ON THE SENSITIVITY CENTERS OF SENSITIVE NUCLEAR EMULSIONS, SUCCESSIVELY OF GOLD AND OF TRIETHANOLAMINE [SUR LES CENTRES DE SENSIBILITE DES EMULSIONS NUCLEAIRES SENSIBILISEES SUCCESSIVEMENT D'OR ET DE TRIETHANOLAMINE]

D. M. Samoylovich, I. V. Ardachev, and E. S. Barinova *In its* Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 13 p refs In FRENCH (See N65-28375 17-24)

The composition of the centers of sensitivity of the nuclear emulsion R, sensitized in successive stages with preradiation treatment with triethanolamine (TEA) and by chemical maturation with gold salts, was studied experimentally. Results and discussion are presented on various topics: (1) the effect of hypersensitization by TEA in emulsions of different sensitivities, particularly in emulsions of different sensitivities, particularly in emulsions initially treated with acids; (2) the stability of the latent image, i.e. the centers of development of emulsions hypersensitized by TEA in acid treatment; (3) the stability of sensitivity centers in treatment with water and acids in various states of hypersensitization; and (4) the effect of hypersensitization in aged emulsions. Trans. by J.M.D.

N65-28389 European Organization for Nuclear Research, Geneva (Switzerland).

ON THE PREPARATION AND CHARACTERISTICS OF A VERY CONCENTRATED NUCLEAR EMULSION [SUR LA PREPARATION ET LES CHARACTERISTIQUES D'UNE EMULSION NUCLEAIRE TRES CONCENTREE]

A. Apostol and M. Nicolae *In its* Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 4 p refs In FRENCH (See N65-28375 17-24)

A method which can be used to prepare an ionographic emulsion containing 93% or 94% silver bromide is presented, and some characteristics of the emulsion are described. The sensitivity of these concentrated emulsions to nuclear particles and electrons, in comparison to ordinary emulsions, was evaluated by the method of enumeration of grains in the traces, and also by the method of direct dye blackening. It was found that the density of the grains in the traces in the emulsions is improved by the described technique, although the density of the film is not. Trans. by J.M.D.

N65-28390 Washington Univ., Seattle.

PREPARATION OF EMULSION STACKS FOR UNDERGROUND COSMIC RAY EXPERIMENTS

Don M. Cottrell, J. A. Kirk, J. J. Lord, and R. J. Piserchio *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 7 p ref (See N65-28375 17-24)

For study of high energy muon interactions, emulsion stacks of adequate purity can be prepared simply and quickly at the underground sites where they are to be exposed. The method of preparation involves taking the emulsion underground in gel form, and then melting it and recasting it into solid pellicles. The pellicle mold is portable, and consists of a glass plate and blocks to form dikes; the liquid hardens within the mold in about fifteen minutes. In this way it is possible to make enough pellicles for emulsion stacks as large as one liter under the crude laboratory conditions afforded by the underground mines available for this kind of study. J.M.D.

N65-28391 Washington Univ., Seattle.

LOADING OF EMULSIONS WITH DIAMONDS AND POLYSTYRENE FOR EXPERIMENTS WITH STOPPING K-PARTICLES

Dianne M. Davis (Seattle-Pacific Coll.), J. J. Lord, R. J. Piserchio, and Fereidoon Behroozi-Toosi *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 5 p refs (See N65-28375 17-24)

Procedures for preparing photographic emulsions loaded with diamond crystals or with polystyrene sandwich layers are described. Polystyrene test plates were exposed to cosmic rays and to neutron and proton beams; preliminary scanning indicates that the results for the plates are comparable to those for diamond loaded emulsions. Polystyrene plates can be made that will have a much larger percent carbon than with diamond loaded emulsions. J.M.D.

N65-28392 Tata Inst. of Fundamental Research, Bombay (India).

LOADING OF NUCLEAR EMULSION WITH LIGHT AND HEAVY ELEMENTS

S. N. Ganguli, P. J. Kajarekar, and M. S. Swami *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 4 p refs (See N65-28375 17-24)

The loading of electron sensitive emulsions with salts of lithium and bismuth, and diamond in crystal form, is reported. The method used involves mixing the dry additive directly into the liquid emulsion, which is then cast and solidified into a pellicle. Evaluation of physical characteristics of the gel product, such as uniformity of the layer and the ease of separation from the glass solidification plate, showed that the lithium and diamond loading was successful; the use of a 2% weight concentration of bismuth resulted in gels which could not be peeled in good condition. J.M.D.

N65-28393 Agfa-Gevaert, A. G., Leverkusen (West Germany). Wissenschaftliches Laboratorium.

FUNDAMENTAL ASPECTS OF GROWTH AND SHAPE OF PHOTOGRAPHIC SILVER HALIDE CRYSTALS

E. Klein and E. Moisar *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 11 p refs (See N65-28375 17-24)

A review of studies on the crystal properties of silver halide in photographic emulsions is presented. Crystal shape and the mechanism of crystal growth, under conditions of rapid or slow mixing of silver and halide solutions, are discussed. Experiments on rate- and diffusion-controlled growth show that there is an initial rapid growth increase in mean particle size, followed by slower growth. Under certain nucleation conditions it is possible to obtain crystal nuclei with no structural imperfections. During the ripening process these nuclei undergo recrystallization. The conditions during recrystallization and further growth determine whether the crystals grow by a diffusion- or rate-controlled process, and whether (100)- or (111)-planes, or both, form the crystal faces. J.M.D.

N65-28395 European Organization for Nuclear Research, Geneva (Switzerland). Emulsion Group.
TESTS ON EMULSION SENSITIVITY AT LIQUID H_2 TEMPERATURE
In its Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 4 p refs (See N65-28375 17-24)

The sensitivity of Ilford G5 and K5 emulsions was investigated at liquid hydrogen and liquid nitrogen temperatures, to determine whether they would be useful in experiments to observe minimum ionizing particles such as the positive sigma hyperon. In each case the grain density was observed at room temperature before cooling the emulsion, and again during the cold exposure; the ratio of these values was taken as the measure of sensitivity. The results showed that K5 emulsions are not sufficiently sensitive at liquid hydrogen temperature for the experimental purposes, but that G5 emulsions are more suitable. J.M.D.

N65-28396 European Organization for Nuclear Research, Geneva (Switzerland).
REGRESSION OF SENSITIVITY AND LATENT IMAGE IN NUCLEAR AND LIGHT-SENSITIVE PHOTOGRAPHIC EMULSIONS
A. L. Kartuzhanskii, A. F. Yurchenko, L. I. Shur, and G. G. Martysh *In its* Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 11 p refs (See N65-28375 17-24)

To determine the effects of aging on sensitivity and quality of latent image, highly sensitive emulsions of the nuclear R type and the negative type Panchrom-10 were exposed to alpha or beta radiation or incandescent light shortly after preparation, and were then stored at various temperatures and humidities. During this process a sequence of blackenings was observed for each sample to construct sensitograms. The results for both types of emulsions showed that for any storage conditions the light sensitivity decreases monotonically, whereas the variation in sensitivity to particles is complicated. For the R emulsion the regression in latent image differs from that of sensitivity; however the two effects appeared the same in Panchrom-10. Decrease in temperature and humidity appears to reduce both types of regression. J.M.D.

N65-28398 Deutsche Akademie der Wissenschaften zu Berlin, Zeuthen (East Germany). Forschungsstelle für Physik Hoher Energien.
PROPERTIES OF NEW NIKFI AND ORWO NUCLEAR EMULSIONS
U. Krecker *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 7 p refs (See N65-28375 17-24)

Two new highly sensitive nuclear emulsions were studied experimentally and compared with the standard R emulsion. These are considered ordinary nuclear emulsions and do not contain fine grains. Blob density, distortion, and spurious scattering under proton irradiation were observed in tests of the ORWO-K 5 emulsion, and the results indicate that these properties do not differ much from those for the R emulsion. In similar tests the NIKFI-BR 2 emulsion revealed no differences in quality in comparison with the R emulsion but showed higher sensitivity. J.M.D.

N65-28399 European Organization for Nuclear Research, Geneva (Switzerland).
THE PROPERTIES OF FINE-GRAINED NUCLEAR EMULSION TYPE PR-2.
N. A. Perfilov, N. R. Novikova, V. J. Zakharov, and E. V. Fadina *In its* Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 9 p refs (See N65-28375 17-24)

A fine-grained emulsion is discussed which gives a higher grain density for relativistic particles without additional hypersensitization with triethanolamine prior to irradiation. Also, the photographic processing of this film is considered. The best results were obtained with the pyrogallolamidol developer used for quick processing of photosensitive materials. Soda was substituted by borax which lowered the pH and increased the life of the developer. A comparison of the effect of the pyrogallol-amidol developer and of the methol-hydroquinone and amidol developers widely used in nuclear photography is shown. The emulsion properties are tabulated. The emulsion also has adequate sensitivity-retaining characteristics. If solidly packed, the photolayer may be kept in a refrigerator for 4 months without change of sensitivity. E.E.B.

N65-28400 Lausanne Univ. (Switzerland). Lab. de Recherches Nucleaires.
SENSITIVITY OF NORMAL AND HYPERSENSITIZED ILFORD K5 EMULSIONS AT LOW TEMPERATURES [SENSIBILITE DES EMULSIONS ILFORD K5 NORMALES ET HYPERSENSIBILISEES AUX BASSES TEMPERATURES]
T. Ben Sedrine and R. Weill *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 8 p In FRENCH; ENGLISH summary (See N65-28375 17-24)

We observe that normal Ilford K5 emulsions exposed at −198° C keep 70% of their sensitivity at 20° C if the processing starts immediately after the warming. The sensitivity, defined as the relative blob density on the tracks of 40 MeV electrons or 1 GeV/C pions, decreases when the delay between warming and processing increases. On the contrary, the sensitivity of hypersensitized K5 emulsion remains about 70% even after 28 hours. The same experiment was repeated at liquid helium temperature. The sensitivity is then so low that it is difficult to get unbiased measurements. Author

N65-28401 European Organization for Nuclear Research, Geneva (Switzerland).
COMPARATIVE HYPERSENSITIZATION OF NUCLEAR EMULSION WITH TRIETHANOLAMINE AND OTHER ALKALINE SENSITIZERS [HYPERSENSIBILISATION COMPARATIVE A TRIETHANOLAMINE ET AUX AUTRES SENSIBILISATEURS ALCALINS DE L'EMULSION NUCLEAIRE]
D. M. Samoylovich, J. V. Ardachev, and E. S. Barinova *In its* Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 5 p refs In FRENCH (See N65-28375 17-24)

The use of triethanolamine (TEA) in forming hypersensitive nuclear emulsions was compared experimentally with ammonia, ammonia plus silver chloride, sodium hydroxide, and sodium carbonate. Observations were made on the resulting density of grains in the traces, and on the density of the film. The values for TEA were quite similar to those for the alkaline sensitizers. These tests demonstrate the sensitizing mechanism of the alkaline agents, and shows that the TEA treatment is not superior. Trans. by J.M.D.

N65-28402 NIKFI Inst., Moscow (USSR).
A DEVELOPER FOR NUCLEAR PHOTOGRAPHY [UN REVELATEUR POUR LA PHOTOGRAPHIE NUCLEAIRE]
C. S. Bogomolov, T. I. Krestovnikova, M. S. Khaikin, I. I. Levkoyev, and V. A. Koukhtin *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 8 p refs In FRENCH (See N65-28375 17-24)

Amidol and several derivatives of 4-aminopyrazolone were compared experimentally as developing reagents in nuclear emulsions. Experimental layers were irradiated with 12 to 14 MeV electrons with the aid of a betatron. The outcome was evaluated on the basis of photographic sensitivity, which was estimated from the number of grains in the electron traces and

the grain density of the developed film. Homogeneity in depth of the layer was also investigated, where the difference between the number of grains in the traces near the surface and the number within the layer was measured. The results varied among the individual derivatives. The derivative 1-phenyl-3-methyl-4-aminopyrazolone showed a weakness of film surface and homogeneity in layer depth which may facilitate identification of traces of charged particles in emulsions. Trans. by J.M.D.

N65-28403 NIKFI Inst., Moscow (USSR).
THEORETICAL GROUNDS FOR THE SELECTION OF DEVELOPING AGENT FOR INTRODUCING IT INTO THE NUCLEAR EMULSION
Y. M. Veprik, A. P. Zhdanov, G. G. Martysh, and L. I. Shur *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 7 p refs (See N65-28375 17-24)

To facilitate the process of development of nuclear emulsions, a method was developed for introducing the developing agent into the emulsion. Para-oxyphenylglycin was used for this purpose. The best results were obtained with 0.075 ml of this compound dissolved in a 0.1 liter of soda solution before coating the plates. Optimum development time was found to be 45 minutes at a pH of 11. The density of α-particle tracks was somewhat lower for plates with the developer added; however, the density of the α-particle tracks was high enough for distinct discrimination. Also, the decrease of concentration in the emulsion layer of the developing agent in its oxidized form brought about an increase in the rate of development. The introduction of sulphite brought an increase of density of the fields compared in these investigations. The activity of developing agent can be changed by introducing different agents which influence the redoxy potential. E.E.B.

N65-28404 European Organization for Nuclear Research, Geneva (Switzerland).
AUTOMATION OF THE ISOTHERMIC DEVELOPMENT PROCESS OF NUCLEAR EMULSION [L'AUTOMATISATION DU PROCESSUS DE DEVELOPPEMENT ISOTHERMIQUE DE L'EMULSION NUCLEAIRE]
V. D. Ryabov *In its* Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 5 p ref In FRENCH (See N65-28375 17-24)

A device for automatic developing of nuclear emulsions is described which controls the temperature of the process. Ordinarily the development of nuclear emulsions is time consuming, involving many detailed operations which must be carried out by hand. With this automated assembly, the washing and fixing of the emulsion is accomplished in six hours. The function of the switches, relays, pumps, thermostats, and the panel of control indicators is detailed. An installation schematic and a circuit diagram for the developer are shown. Trans. by J.M.D.

N65-28405 European Organization for Nuclear Research, Geneva (Switzerland).
STUDY OF THE FACTORS INFLUENCING THE QUALITY OF DEVELOPMENT WITH THE ELECTRODIALYZER [L'ETUDE DES FACTEURS, INFLUANT SUR LA QUALITE DU DEVELOPPEMENT A L'ELECTRODIALYSEUR]
D. M. Samoylovich, A. A. Kondrachina, and V. G. Tarassenkov *In its* Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 12 p refs In FRENCH (See N65-28375 17-24)

In this report we describe the improved electrodialyzer which we used in studying the influence of various factors on the density of traces and on the film gage in nuclear emulsions, and in studying the influence of these factors on the uniformity of the development across the layer. We show curves which illustrate experimental results and the development process, which demonstrate uniform development with satisfactory grain density, and with low film gage. The developing time for layers of 600 μm is about twenty minutes, instead of the several hours necessary with other known methods. The experimental results serve as the basis for construction of a semi-automatic developer for layers in an emulsion chamber. It is expected that the washing and fixing time could be diminished with the aid of an electric field. Trans. by J.M.D.

N65-28406 Indian Inst. of Tech., New Delhi.
CORRELATION BETWEEN DISTORTION IN NUCLEAR EMULSIONS AND SUCCESSIVE DIFFERENCES USED IN MULTIPLE SCATTERING MEASUREMENTS
P. K. Aditya *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 8 p refs (See N65-28375 17-24)

Coordinate measurements were made on a large group of tracks closely spaced in a certain region of the emulsion. The distortion contours were obtained by graphical plot and by the method of algebraic mean. An analysis of successive differences of these coordinate measurements for multiple scattering was made in terms of the distortion observed. It was shown that there is a strong correlation between the ratio of successive differences and the distortion contours. E.E.B.

N65-28407 Deutsche Akademie der Wissenschaften zu Berlin, Zeuthen (East Germany). Forschungsstelle für Physik Hoher Energien.
DISTORTION AND SPURIOUS SCATTERING IN NIKFI-R NUCLEAR EMULSION
V. Krecker *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 11 p refs (See N65-28375 17-24)

An investigation into distortions and spurious scattering in nuclear emulsions revealed that the distortions are not very high. There does exist a preferred direction of the distortions over the whole surface of a pellicle. The variation from batch to batch is always greater than the variation which comes from different development procedures. If the emulsion sheets are stored before irradiation under conditions of high temperature with or without high humidity, then the preferred direction of distortions is destroyed and the magnitude of the distortions decreases. Also, the variation of spurious scattering with respect to its magnitude and dependence of cell length from batch to batch is greater than the variation in emulsions of the same batch but developed in different ways. The mean value of the second differences of the spurious scattering increases with dip angle above a dip angle of 2° of the measured tracks, but the mean value of the second differences corrected with the help of the third differences remains constant. The dependence of spurious scattering upon the energy of the incident particles is also discussed. E.E.B.

N65-28408 Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics.
ON THE PROBLEM OF SPURIOUS SCATTERING IN NUCLEAR EMULSIONS
E. Fenyves, E. Gombosi, L. Janossy, P. Kiraly, A. Lee et al *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 14 p refs (See N65-28375 17-24)

A method for the estimation of the energy of a particle from the sagittas measured on its track in nuclear emulsions in the presence of noise and spurious scattering is presented. For the estimation of both the Coulomb scattering and the relevant error bounds, the joint probability distribution of Coulomb scattering, noise sagittas and spurious scattering must be known. The estimation method presented was checked with 10 FeV protons and 3.5 GeV pions. The energy of the pions was treated as unknown. Values obtained by the method gave good results, a value of 3.46 $\pm$0.10 as compared with 3.5 GeV. E.E.B.

N65-28409 Osmania Univ., Hyderabad (India). Dept. of Physics.
SOME RESULTS ON SPURIOUS SCATTERING IN PHOTOGRAPHIC EMULSIONS
G. K. Rao and A. A. Kamal *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 16 p refs (See N65-28375 17-24)

If spurious scattering were merely a random phenomenon arising from independent microscopic dislocations then it should be dip independent. The dip dependence together with the loss in correlation between tracks in depth suggest that spurious scattering is mainly a layer phenomenon. Also, the study of contours of tracks at various depths shows that the grain movement can change the track direction fairly rapidly throughout the depth. If the tracks are sufficiently steep then the contours appear c-shaped, especially when observed over small distances; and s-shaped if the tracks have penetrated large depths of emulsion over which the gradients may change in the opposite direction. For very long tracks the correlations between regions along the x-direction will be lost. Thus, there will be certain randomness associated in regions widely separated which would tend to mask out the curvature effect, and the track would invariably appear wavy. It therefore appears that in studying the properties of spurious scattering the effects arising from the processing regime must be separated from those which result from mechanical stresses. E.E.B.

N65-28410 Osmania Univ., Hyderabad (India). Dept. of Physics.
AN INVESTIGATION INTO SPURIOUS SCATTERING IN PHOTOGRAPHIC EMULSIONS
Y. Venkateswar and A. A. Kamal *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 10 p refs (See N65-28375 17-24)

From multiple scattering measurements made on 17 GeV/c pion beam tracks, it was found that the correlation coefficient for spurious scattering between second and third difference had a value of the order of unity. This was attributed to the distortion component of spurious scattering. The effect of randomization on higher differences and the variation of the spurious signals were also investigated, and various methods for the elimination of spurious scattering were examined. E.E.B.

N65-28417 California Univ., Berkeley. Lawrence Radiation Lab.
OPTIMUM MULTIPLE SCATTERING
Douglas E. Greiner *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 7 p refs (See N65-28375 17-24)

A mathematical study of the best utilization of multiple scattering data for determining the scattering rigidity of a particle is described. Variables relating to the projected image of an arbitrary track pictured in graphic form are defined. Such variables as angles of deflection, number of deflections, and distances between bends in the track are considered among others. By assuming a Gaussian distribution for second differences the mean squared noise-free second difference (s) can be related to the scattering rigidity, and it is shown that any difference product average is a linear combination of two noise functions. A method is suggested for determining scattering rigidity as a result of the calculations. Ordinates of the track at a short cell length should be measured. Several multiples of the measured cell length are then calculated. When in the region where the mean squared noise-free second difference (s) is proportional to the cube of a track length of t distance, calculate rigidity and error. Test other cell lengths in the region for smaller error. L.S.

N65-28419 Valencia Univ. (Spain). Instituto de Física Corpuscular.
MOMENTUM DETERMINATION OF LOW MOMENTUM PARTICLES IN EMULSIONS EXPOSED TO A STRONG MAGNETIC FIELD
E. Villar, R. Llosa, D. Gil, P. Tarrega, and A. Lleo *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 7 p refs (See N65-28375 17-24)

A method, applying strong magnetic fields to nuclear emulsions of reduced size is described for determining the momentum of low $p\beta$ particles with high values for the proportion between the Coulomb and curvature sagitta D_S/D_M. A high value for the proportion between D_S/D_M for low $p\beta$ proton particles usually results in a distorted curvature, thus accounting for the high momentum error obtained. In the described method the momentums are obtained by determining the magnetic curvature. Tables listing particle momentum data, and curves are included. L.S.

N65-28420 Academy of Sciences (USSR), Moscow.
REGISTRATION OF α PARTICLE STARS PRODUCED BY RADIOACTIVE NUCLEI AND TIME DISCRIMINATION OF α PARTICLE TRACKS IN NUCLEAR EMULSIONS
I. B. Berkovich, A. P. Zhdanov, and L. I. Shur *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 10 p refs (See N65-28375 17-24)

A technique was developed that registers alpha particle formations (starlike in appearance) emitted in nuclear emulsions by radioactive nuclei. Time discrimination of separate alpha particle tracks in alpha particle "stars" was also investigated. Successive 5 minute contacts were made between nuclear collectors (with accumulated nuclei) and wet emulsion layers for investigating the relation between diffusion and time, introducing Ra^{223} and Ra^{224} nuclei into the emulsion. The quantity of diffused nuclei was determined by counting the number of alpha particle "stars". Data on the rates of diffusion for these and some other elements are given. The results indicate a possibility of discriminating alpha particle tracks being registered using 5-minute contact interval measurements. L.S.

N65-28422 Joint Inst. for Nuclear Research, Dubna (USSR). High Energy Physics Lab.
ON A METHOD OF MEASUREMENT AND CALCULATION OF FAST PARTICLE MOMENTA IN EMULSIONS EXPOSED IN STRONG MAGNETIC FIELDS
B. A. Shahbazian 1963 *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 4 p ref (See N65-28375 17-24)

A method of measuring and calculating fast particle momenta in emulsions exposed to strong magnetic fields is proposed that uses the first differences of coordinates taken at either two or three points of the particle track. The method was checked for pion tracks of 3.85 GeV/c momentum in a magnetic field of 48 kilogauss. Positive results were obtained, and are shown in a table. The method differs from the method of second differences only by the absence of the 4 D cut-off procedure. Both methods give comparable and reliable results. In the proposed method, coordinates are measured at 10–15 points towards the beginning and end of the track, and then the corresponding first differences are calculated. This method is recommended for use with tracks longer than 3 cm. For stronger magnetic fields, the minimal total length is shorter. L.S.

N65-28423 California Univ., Berkeley. Lawrence Radiation Lab.

RANGE DIFFERENCE BETWEEN POSITIVE AND NEGATIVE PIONS IN EMULSION

Walter H. Barkas, W. Z. Osborne, William G. Simon, and F. M. Smith *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 8 p refs (See N65-28375 17-24)
(UCRL-11518)

An experiment was designed to measure the range differences for pions in emulsion whose energies are in the vicinity of one Mev. The apparatus consisting of a small copper target, a neutron shield, and emulsion plates (all placed in a vacuum chamber and between the poles of a large magnet) is described and shown in a picture. Four runs were made. The plates were scanned for pi mesons under 1000× magnification. Mesons are recognized by their large multiple scattering and their characteristic endings. One prong negative pi mesons were distinguished from positive pi meson decays by estimating the ionization. Zero prong negative pi "stars" which have characteristic blobs at their ending were also included in the analysis. A table giving data on the measured range differences between negative and positive pions with approximate energy of 1.6 Mev is given. L.S.

N65-28424 Naval Postgraduate School, Monterey, Calif.

EMULSION GRAIN DENSITY IN THE EXTREME RELATIVISTIC REGION

F. R. Buskirk, J. N. Dyer, H. D. Hanson, R. Seng, and R. H. Weidman *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 5 p refs (See N65-28375 17-24)

Blob densities were measured for pion and electron tracks in the range γ 2 to 4000 (where γ is represented by a function) as a measure of the particle ionization. Other track parameters give greater information content, but the ease and accuracy with which blob data can be gathered offsets this for near minimum tracks. Normalized blob densities are shown graphically, and the data from each of four pellicles of 600μ emulsion are indicated by a different symbol. Each data point represents enough tracks to give a total of several thousand blobs, thus diminishing the uncertainty to less than 2%. Inspection of the graph shows that the data from each pellicle are consistent with the assumption of a flat plateau beginning at γ equal to 100. No significant evidence for departure from a flat plateau in the region of γ greater than 100 was found. L.S.

N65-28425 Punjab Univ., Chandigarh (India). Dept. of Physics.

ON THE 'SCATTERING CONSTANT' IN NUCLEAR EMULSIONS

P. M. Sood and V. S. Chohan *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 9 p refs (See N65-28375 17-24)

Scattering constant (K) has been determined in G_5 nuclear emulsions by Fowler's coordinate method for cell lengths 3 mm to 4 cm and by coordinate displacement method for cell lengths 4 mm to 8 cm. Whereas the former method gives satisfactory results at all the cell lengths investigated, the latter method has been found to be useful for cell lengths greater than 3 cm. Our results, within statistical errors, agree with the theoretically expected values. Author

N65-28426 Naval Research Lab., Washington, D. C.

RELATIVISTIC INCREASE IN TRACK BLOB DENSITY IN VARIOUS NUCLEAR EMULSIONS

A. J. Herz and B. Stiller Sep. 1964 *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 9 p (See N65-28375 17-24)

Electron and pion exposures were obtained in several types of nuclear emulsions to determine the magnitude of blob density, to determine whether it is the same in different types of emulsion, and to determine whether it changes from emulsion batch to batch. The experiments were conducted in a manner such that variations in temperature and humidity which could lead to variations in sensitivity and in the rate of fading were eliminated. Details of the exposures are given in a diagram. Values of the ratio g/g_{min} (normalized blob density) were plotted as a function of γ-E/mc^2. The values indicate that for all the emulsions except one, the three points at γ equal to 293, 752, and 1953 are consistent with expectations for samples from a distribution with standard deviation of 1%, and the trends exhibited are different in different emulsions. There is no evidence that the rates of energy loss at the three γ values are not the same. In addition, all the normalized blob densities obtained were graphed and compared with a Gaussian curve of the same mean value and with standard deviation of 1.4%. No systematic trends in the variation of the relativistic rise with emulsion type was found. L.S.

N65-28427 Hungarian Academy of Sciences, Budapest. Central Research Institute for Physics.

STUDY OF THE MULTIPLE SCATTERING CONSTANT IN EMULSION AT GREAT CELL LENGTHS

G. Bozoki, E. Gombosi, L. Jemik, E. Nagy, and M. Sahini *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 9 p refs (See N65-28375 17-24)

The dependence of the multiple scattering constant (K) in a nuclear emulsion on cell length was determined from cell lengths of 0.5 cm up to 10.0 cm by two different methods. The coordinate method was used in the interval 0.5 to 3.0 cm, and for higher cell lengths the angular dispersion method was used. At 3.0 cm, K was determined with both methods to check their consistency. The K values obtained by both methods are in agreement, show a small but significant dependence on cell length, and can be well approximated. Values of K from published measurements at different energy values in the 0.1 cm to 10.0 cm cell length internal were tabulated and compared to the experimental results. It is found that for high energy particles K is constant at cell lengths greater than 0.1 cm, but smaller than expected from the theory of Voyvodic and Pickup, even when the influence of spurious scattering is not taken into account. L.S.

N65-28428 Academy of Sciences (USSR), Moscow.

IONIZATION-MOMENTUM DEPENDENCE FOR ELECTRONS AND POSITRONS OF HIGH ENERGY

G. B. Zhdanov, M. I. Tretjakova, and M. N. Shcherbakova *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 3 p ref (See N65-28375 17-24)

A series of measurements on momentum and charge sign (determined by magnetic curvature of the track) were made on 60 electron–positron pairs in photoemulsions exposed in a pulsed magnetic field of 180 Koe in a proton beam with 24 GeV/c momentum for studying a possible difference between the ionizing capacity of particles with different signs. Ionization value relations for tracks of a positron and electron of given pairs are graphed. The relation I^+/I^- averaged 1.004 $\pm$0.007. The results of measurements of electron and positron ionization values related to the calibration value of proton ionization with 24 GeV/c momentum are also represented in graphic form, and calculations show that for particles with momentum greater than 0.1 GeV/c the ratio I^+/I^- is 1.006 $\pm$0.006. Thus a possible difference in the ionizing ability of particles with different signs does not exceed 1.5 +2% if it exists at all. L.S.

N65-28429 California Univ., Berkeley. Lawrence Radiation Lab.

ARTIFICIAL CONSTRUCTION OF PARTICLE TRACKS BY A MONTE CARLO METHOD

Francis M. Smith, Hla Shwe, and Walter H. Barkas *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 4 p ref (See N65-28375 17-24)

(UCRL-11624)

We describe here a Monte Carlo method of successively generating the grain coordinates of particle tracks in emulsion. For such a calculation one needs to know three parameters of the distribution functions of the grain variables. These are the parameters of multiple scattering, grain noise and grain spacing. To generate equivalent tracks, the parameters for the distributions of these three random variables may be experimentally determined for a fair sample of real tracks. The method was developed for an emulsion application, but it is readily adapted to other instruments such as the bubble chamber, and to problems of the spatial distribution of ionization in a beam of particles penetrating matter. We also give a brief description of the IBM 7094 program for performing such Monte Carlo calculations of particle track grains. Author

N65-28430 Kansas State Univ., Manhattan.

ON THE WIDTH OF HEAVY ION TRACKS IN EMULSION

Robert Katz and J. J. Butts *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 14 p refs (See N65-28375 17-24)

The width of heavy ion tracks along the entire track length was measured by projecting an image of each track onto a screen by means of a microscope and a xenon lamp, and by tracing the outline of 50μ segments to obtain the area. Experimental data are compared with track width curves obtained from Lonchamp's and Bizzeti-Della Corte models. Though the experimental results are substantially more in agreement with the Bizzeti model than with the Lonchamp model, particularly in the first 100μ, predicted track widths are greater than any which were observed, and the experimental curves depart from theory in the region from 1000 to 10000μ. Various track width versus range (in microns) curves are presented for several effective charge levels Z. Generally the curves indicate that the 500μ range may be the best place to identify Z on the basis of width measurements, the roughness of the track in this area being compensated for by the possibility of measuring over longer range intervals to improve statistics. L.S.

N65-28431 Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energies

IONIZATION DENSITY IN EMULSIONS ENRICHED WITH HYDROGEN

K. D. Tolstov, L. N. Bokova, L. G. Krivenzova, and L. Popova *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 4 p refs (See N65-28375 17-24)

Blob density measurements were performed on proton, pion, and positive meson tracks in Nifki-Br emulsions enriched with hydrogen, carbon, and oxygen nuclei for investigating the increase of plateau blob density to relativistic minimum I_{pl}/I_{min} that are observed when particles penetrate through polystyrene films with thicknesses less than 0.1 of a AgBr crystal. The emulsion pellicles were loaded with ethylene glycol, allowing doubling of the number of hydrogen nuclei and keeping the relativistic tracks sufficient. This density was found to be 18.5 blobs per 100μ. A table is presented, giving the average composition of elements in normal Nifki emulsions and in the experimental ethylene glycol loaded emulsions. The ratio I_{pl}/I_{min} was calculated from information in the table, and found to be 1.16 for normal emulsion and 1.22 for loaded emulsion. It appears that the observed effect essentially improves identification of fast particles. L.S.

N65-28432 Santiago Univ., Compostela (Spain). Catedra de Física.

DETERMINATION OF RADIOACTIVE ELEMENTS IN SAND. II: STUDY OF THE INDIVIDUAL RADIOACTIVITY OF EACH GRAIN [DETERMINATION D'ELEMENTS RADIACTIFS DANS LES SABLES. II: ETUDE DE LA RADIACTIVITE INDIVIDUELLE DE CHAQUE GRAIN]

J. Casanova and Fdz. Carracedo *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 5 p refs In FRENCH (See N65-28375 17-24)

To gain useful information on methods of obtaining concentrations of monazites, the radiation attributable to individual grains of sand was studied experimentally. Sand was emulsified in a photonuclear gel, liquifiable at 30° C, and photographs taken through a microscope show traces of alpha particles. Trans. by J.M.D.

N65-28433 Tunis Univ. (Tunisia). Dept. of Sciences.

STARS CREATED BY π MESONS AT REST: NATURE OF THE BRANCHES OF UNIT CHARGE [ETOILES CREES PAR LES MESONS π AU REPOS: NATURE DES BRANCHES DE CHARGE UNITE]

M. Dellagi *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 7 p refs In FRENCH (See N65-28375 17-24)

Measurements of multiple diffusion were used in studying the nature of the branches of unit charge and the distribution of diffusion distances above 1100μ relative to the stars created by π mesons in nuclear emulsions. The experimental results support the hypothesis of the absence of tritons, and show that there are 1.1 $\pm$0.2 times as many deuterons as protons. Trans. by J.M.D.

N65-28434 National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

NUCLEAR EMULSION EXPERIMENTS ON SOUNDING ROCKETS AND SATELLITES

D. E. Guss, C. E. Fichtel, and D. A. Kniffen *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 6 p (See N65-28375 17-24)

Nuclear emulsions mounted as part of the payload of small sounding rockets have been used successfully to study the charge distribution and energy spectrum for particles from solar flares and galactic cosmic rays, and to study the protons in the inner region of the Van Allen Belts. The emulsions have been recovered in good condition. Although they allow relatively short exposure of the emulsion plates, the use of small sounding rockets such as Nike Cajun, Argo, and Aerobee make possible experiments which can be done only outside the atmosphere. J.M.D.

N65-28435 California Univ., Berkeley. Lawrence Radiation Lab.

EMULSION EXPERIMENTS IN ORIENTED POLAR-ORBITING SATELLITES

H. H. Heckman and G. H. Nakano *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 14 p refs Prepared jointly with Lockheed Missiles and Space Co. (See N65-28375 17-24)

We have shown in an experiment that emulsion detectors placed in an accurately known geometry aboard oriented polar-orbiting satellites can give detailed information on the properties of the trapped proton component in the South Atlantic anomaly. The principal results of this experiment can be summarized as follows: (1) The particle scale height and flux variation with minimum mirror-point altitude can be explained by the properties of the atmosphere when proper account is taken

of the averaging effects produced by the trapped particle's drift and mirror oscillations around the earth; (2) No change in the flux profile vs. altitude for 65 MeV protons is in evidence when the present data are compared with Explorer IV (1958) results; (3) The 1962–63 proton flux in the region of the South Atlantic anomaly is four times greater than that expected from the Explorer IV (1958) count-rate curves; and (4) The shape of the proton energy spectrum above 58 MeV ($L < 1.5$) has remained constant, within the errors of measurement, since 1959. Author

N65-28436 Max-Planck-Institut für Physik und Astrophysik, Munich (West Germany).
THE USE OF GAS TARGETS FOR SCATTERING EXPERIMENTS
W. Hitzeroth *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 4 p (See N65-28375 17-24)

Nuclear emulsions have been used with gas targets in studying particle scattering. Drawings of various parts of this combination are presented and are discussed generally. J.M.D.

N65-28437 Tennessee Univ., Knoxville.
COMPARISON OF π^0 INTENSITY MEASUREMENTS IN EMULSIONS AND BUBBLE CHAMBERS
D. T. King *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 7 p refs Sponsored by NSF (See N65-28375 17-24)

The determination of π^0 emission intensity from energetic π^-, nucleus collisions in bubble-chamber experiments is in accord with theoretical expectations, but leads to a result significantly larger than the corresponding emulsion determination. This divergence might be ascribed to the following reasons: (1) Failure to detect related electron pairs in the emulsion search; (2) Low statistical weight of the emulsion result; (3) The great difference in resolving power between bubble chamber pictures and emulsions, producing, for some unexplained reason, an apparent effect. A further series of observations is being made in an effort to decide which of these alternatives is responsible for the discrepancy. Author

N65-28438 Czechoslovak Academy of Sciences, Prague. Inst. for Nuclear Research.
FILM DOSIMETRY WITH INHIBITED DEVELOPMENT
Josef Kubal *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 3 p refs (See N65-28375 17-24)

The ability of benzotriazol to desensitize photographic material was established experimentally, and it was found that it makes possible film dosimetry of gamma radiation for doses as high as 100r. This result was observed for benzotriazol concentrations of 2 to 3 g per litre. Phenylmercaptotetrazol was also tested, and was found to be an effective development inhibitor in the range of concentrations 0.2 to 0.3 g per litre. J.M.D.

N65-28439 Technische Hochschule München (West Germany) Laboratorium für Technische Physik.
MEASUREMENT OF THE β-PARTICLE DISTRIBUTION OF MASS SELECTED FISSION FRAGMENTS WITH NUCLEAR EMULSIONS
H. Opower, E. Konecny, and H. Gunther *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 7 p refs (See N65-28375 17-24)

The use of nuclear emulsions for experimental determination of the distribution of numbers of beta particles emitted from fission fragments was demonstrated. First, for assurance that all betas can be detected irrespective of their energies, several emulsions were exposed to a known number of betas from the background of a magnetic conversion spectrometer at energies ranging from 100 kev to 5 mev, and the results showed that the tracks can be counted over that range. Then experiments were done with fission fragments of mass 134, and the frequency of particles was observed as a function of the number of emitted beta particles. J.M.D.

N65-28440 Parma Univ. (Italy). Istituto di Fisica.
NUCLEAR EMULSIONS AS DETECTORS OF FALL-OUT
I. Ortalli *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 2 p (See N65-28375 17-24)

Various plants and animals which comprise plankton were placed in nuclear emulsions, and in some of the younger forms a dark halo appeared in which beta traces were observed. The same plankton coated after 18 months did not show this strong halo. These results are compared with the phenomena observed in fresh plankton which are associated with the presence of strontium, and it is concluded that nuclear emulsions are a convenient way of revealing the fall-out absorbed by biological materials in their natural habitat. J.M.D.

N65-28441 Joint Inst. for Nuclear Research, Dubna (USSR).
USING PHOTOEMULSION IN PROTON DYNAMIC POLARIZATION CONDITIONS
V. I. Luschikov and K. D. Tolstov 1964 *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 4 p refs (See N65-28375 17-24)

To determine whether the dynamic polarization method can be employed with the use of nuclear photoemulsions, experiments were performed to investigate the change in Q caused by the presence of nuclear photoemulsions inside the cavity of a helium cryostat. It was found that at room temperature, and at liquid nitrogen temperature, the cavity Q decreased by more than 20 times in comparison with the value for the free nonloaded cavity; at helium temperature the Q decreased only by a factor of 3. This effect can be considerably reduced by putting the emulsion plates along the cavity walls, or by further lowering of the temperature. Since the dynamic polarization method requires insignificant power—10 to 50 mW—it is concluded that the technique can be used with photonuclear emulsions. J.M.D.

N65-28442 Joint Inst. for Nuclear Research, Dubna (USSR).
ON PHOTOEMULSION EXPERIMENTS WITH A HYDROGEN-JET TARGET
K. D. Tolstov 1964 *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 6 p refs (See N65-28375 17-24)

Recent literature on photoemulsion experiments using hydrogen-jet targets which cross the orbit of high energy protons at the end of their acceleration cycles is reviewed and discussed briefly. These experiments were directed toward study of elastic p–p scattering, isobar excitation in p–p collisions, and various particle energy and angular spectra in p–p and p–D collisions. J.M.D.

N65-28443 Seville Univ. (Spain). Lab. de Radiactivite et Phisique Nucleaire.
THE CONTRACTION FACTOR OF ILFORD G5 NUCLEAR EMULSIONS EMPLOYED IN ALPHA SPECTROMETRY [LE FACTEUR DE CONTRACTION DES EMULSIONS NUCLEAIRES ILFORD G5 EMPLOYEES EN SPECTROMETRIE ALPHA]
C. Romero, M. Zamora, and V. Gandia *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 7 p refs In FRENCH (N65-28375 17-24)

An experimental method of studying the contraction factor associated with alpha traces in thin nuclear layers is presented. A silver plate is coated with bismuth 210, which disintegrates to polonium 210 by giving up a beta particle, and then to lead 206 with the emission of an alpha particle. The length of the alpha trace, l, is measured microscopically in the film, along with the projection, x, of the particle on the plane of the plate, and the depth of the trace, y. The contraction factor, k, is defined by the relationship, $l^2 = x^2 + k^2y^2$, and can then be estimated from a series of trace observations. The method is illustrated with experimental data, and the variation of k is shown as a function of trace depth. Trans. by J.M.D.

N65-28444 University Coll., London (England).
THE LOCATION OF TRACKS IN NUCLEAR EMULSION WITH THE AID OF SPARK CHAMBERS
E. H. S. Burhop, W. Busza, D. H. Davis, B. G. Duff, D. A. Garbutt et al *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 10 p Prepared jointly with Brussels Univ. and CERN
(See N65-28375 17-24)

The present investigation describes the use of a technique in which tracks of particles associated with rare processes are first located in spark chambers. From the position and direction of the tracks in the spark chamber it has been found possible to locate them in the emulsion stack. The method has been applied to the location of very rare neutrino interactions in nuclear emulsion. Author

N65-28476# Laboratoire de Physique Theorique et des Hautes Hautes Energies, Orsay (France).
ELECTROMAGNETIC FORM FACTORS II
M. Gourdin and J. Micheli May 1965 18 p refs
(TH-95)

A covariant formulation of electromagnetic factors of a particle with spin 3/2 is studied in the formalism of Rarita–Schwinger. The relationship between these form factors and physical factors is given explicitly. The convariant formulation is extended to particles of various spins. Trans. by J.M.D.

N65-28477# Laboratoire de Physique Theorique et des Hautes Energies, Orsay (France).
ON THE PHYSICAL IMPLICATIONS OF GAUGE INVARIANCE
F. Strocchi May 1965 6 p refs
(TH-97)

By considering vector fields for one-parameter gage transformation, it is shown that a strong connection does not exist between gage invariance of the field equations and the properties of a vector field as previously assumed. E.E.B.

N65-28484# Polish Academy of Sciences, Warsaw. Inst. of Nuclear Research.
EXPERIMENTAL NUCLEAR PHYSICS AT THE WARSAW CENTER IN THE YEARS 1945–63
Z. Wilhelmi Apr. 1964 43 p refs
(Rept.-517(I)PL)

The development of the low energy nuclear physics is described. The paper includes the list of papers published in the period 1950–1963 by the coworkers of the Nuclear Physics Chair, Warsaw University, and of the I and I-A Laboratories of the Institute for Nuclear Research, Warsaw. Author

N65-28486# Polish Academy of Sciences, Warsaw. Inst. of Nuclear Research.
INTERACTIONS OF 10 GeV/c IN HYDROGEN WITH THE HIGHEST MULTIPLICITY OF CHARGED PARTICLES
J. Bartke, A. Eskreys, G. Pytkowicz, K. Zalewski, M. Bardadin et al Jan. 1965 27 p refs
(Rept.-597(VI)PH)

A sample of 132 eight- and ten-prong stars produced by 10 GeV/c negative pions from the CERN P.S. in the 80 cm hydrogen bubble chamber has been investigated. These events constitute about 2% of all inelastic events and represent the highest multiplicity observed at this energy of primary pions. It is shown that the momentum transfer to the baryon is often very high. The angular distributions of negative and positive pions do not differ much and both are only slightly anisotropic. The average number of neutral pions is low. Some characteristics of eight-prong interactions are compared with those observed for six-prong stars. A criterion for considering the pion-nucleon collisions as "central" has been suggested and an attempt is made to split the cross-section into central and peripheral parts. Author

N65-28487# Polish Academy of Sciences, Warsaw. Inst. of Nuclear Research.
EMISSION OF FAST DEUTERONS IN INTERACTIONS OF 24 GeV/c PROTONS WITH HEAVY NUCLEI IN EMULSION
Teresa Saniewska, Ewa Skrzypczak, and Przemyslaw Zieliński Jan. 1965 17 p refs
(Rept.-601(VI)PH)

In interactions of the 24 GeV/c protons with heavy nuclei in emulsion the frequency of emission and the angular and momentum distributions of fast deuterons in the momentum interval 400–900 MeV/c are investigated. A very copious emission of fast deuterons in large stars/1.8 ±0.3/per star is observed. The experimental results are discussed from the point of view of the model presented by Butler and Pearson. Author

N65-28513 European Organization for Nuclear Research, Geneva (Switzerland).
RECONSTITUTION OF RECTILINEAR TRACES IN A SPARK CHAMBER BY TRANSPARENT ELECTRODES [RECONSTITUTION DE TRACES RECTILIGNES DANS UNE CHAMBRE A ETINCELLES A ELECTRODES TRANSPARENTES]
V. Chabaud and F. Plouin 22 Apr. 1965 51 p refs In FRENCH
(CERN-65-15)

Most of the spark chambers built up to now have consisted of parallel elements with opaque metal plates or leaves as electrodes. In order to register the data on film it is necessary to photograph these chambers from two points located on the side, in effect looking between the electrodes. A new transparent spark chamber has been built in which the electrodes are made of fine metallic mesh. By using the new spark chamber it is possible to reconstitute rectilinear traces using two different methods developed entirely independently and on different bases. It is shown furthermore, that under certain conditions only a single view is needed for the reconstitution of a trace, and that it is not necessary to know the position of the camera at the moment of taking the picture. Trans. by E.W.

N65-28520# Polish Academy of Sciences, Cracow. Inst. of Nuclear Physics.
RAPID IDENTIFICATION OF ISOBARS BY THE LARGE ANGLE SCATTERING OF LOW ENERGY ALPHA PARTICLES FROM THE CYCLOTRON [SZYBKA IDENTYFIKACJA IZOBAROW METODA ROZPRASZANIA NA DUZE KATY CZASTEK ALFA NISKIEJ ENERGII PRZYSPIESZONYCH W CYKLOTRONIE]
A. Z. Hrynkiewicz, H. Niewodniczanski, and L. Pomorski Jan. 1965 14 p refs Submitted for Publication
(Rept.-402/PL)

The 5 MeV α-particle beam from the cyclotron was used for the identification of isobars by the energy determination of the back-scattered particles. In comparison with the method on the use of natural α-sources the measurement time is much shorter. Preliminary results are reported as an example of the possibilities of the application of this method. Author

N65-28522# Polish Academy of Sciences, Cracow. Inst. of Nuclear Physics.
ENERGY DEPENDENCE OF THE ELASTIC SCATTERING OF ALPHA-PARTICLES ON ^{40}Ca NUCLEI UP TO 179° [ZALEZNOSC ENERGETYCZNA ROZKLADOW KATOWYCH CZASTEK ALFA ROZPRASZANYCH ELASTYCZNIE NA JADRACH ^{40}Ca W PRZEDZIALE KATOW DO 179°]
A. Budzanowski, K. Grotowski, L. Jarczyk, B. Lazarska, S. Micek et al Mar. 1965 24 p refs Submitted for Publication
(Rept.-403/PL)

Differential cross sections for elastic scattering of alpha-particles on Ca^{40} nuclei were measured at energies of 23.37, 24.15, 24.7, 25.23, 26.37, and 28.92 MeV, in an angular range from 22.5° to 179°. An absorption differential method was used for continuous measurement of the energy of the alpha-particles, and the targets were obtained by rolling chemically pure natural calcium to about 3 mg/cm^2 thicknesses. An appreciable increase of the cross-section for extreme back angles was observed for all energies, with a broad resonance at about 24 MeV for the integrated cross section, and at 179° for the differential cross section. Data on each energy measurement are presented in tabular form. M.G.J.

N65-28575# Atomic Energy of Canada, Ltd., Chalk River (Ontario).
SYMPOSIUM ON THE GENERATION OF INTENSE NEUTRON FLUXES
[1965] 75 p refs Symp. held at Chalk River, Ontario, 22–23 Apr. 1965
(AECL-2177) Available from Atomic Energy of Canada, Ltd., Chalk River: $2.00

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N65-28576 Atomic Energy of Canada, Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
INTRODUCTION [TO AECL SYMPOSIUM]
W. B. Lewis *In its* Symp. on the Generation of Intense Neutron Fluxes [1965] 8 p (See N65-28575 17-24) Available from Atomic Energy of Canada, Ltd., Chalk River: $2.00

By way of introduction to the symposium on the Intense Neutron Generator (ING), the cost and utilization of the facility are discussed in general terms. The remarks were to set the stage for the study on how to build a specific neutron generator for a wide range of experiments and products. In concept the facility would give a neutron flux of at least 10^{18} n/cm^2-sec at an operating cost significantly lower than for a fission reactor. E.E.B.

N65-28577 Atomic Energy of Canada, Ltd., Chalk River (Ontario). Neutron Physics Branch.
THE OVERALL PROJECT
G. A. Bartholomew *In its* Symp. on the Generation of Intense Neutron Fluxes [1965] 8 p refs (See N65-28575 17-24) Available from Atomic Energy of Canada, Ltd., Chalk River: $2.00

The arguments which led to the selection of spallation as the basis for the Intense Neutron Generator (ING) are outlined and the overall plan for the project is described. Data are tabulated on the thermal neutron fluxes in various facilities; power densities and fuel-cycle rates in reactors; and the heat generated per neutron of 23 MeV/neutron is about 8 times lower than for a reaction. Considerations of the heat liberated per neutron was the primary reason for choosing the (p, xn) reaction as the basis for ING. Artist sketches are shown of the thermal neutron assembly, initial system, and the system with beam splitting arrangements. E.E.B.

N65-28578 Atomic Energy of Canada, Ltd., Chalk River (Ontario). Applied Physics Branch.
THE 65-mA 1-GeV PROTON ACCELERATOR
P. R. Tunnicliffe *In its* Symp. on the Generation of Intense Neutron Fluxes [1965] 7 p refs (See N65-28575 17-24) Available from Atomic Energy of Canada, Ltd., Chalk River: $2.00

A strong focusing cyclotron with separated orbits was selected to meet the requirements of the Intense Neutron Generator (ING). The advantages of this accelerator are discussed and the vital statistics for the least expensive three-stage assembly are tabulated. A design concept is presented and some of the problems which must receive study are identified. E.E.B.

N65-28579 Atomic Energy of Canada, Ltd., Chalk River (Ontario). Nuclear Physics Branch.
THE INTENSE-NEUTRON-GENERATOR TARGET
J. S. Fraser *In its* Symp. on the Generation of Intense Neutron Fluxes [1965] 8 p refs (See N65-28575 17-24) Available from Atomic Energy of Canada, Ltd., Chalk River: $2.00

The physics of the target material and various target designs for the Intense Neutron Generator (ING) are considered. Some of the formidable problems involved in realizing the very high fluxes that will result from the use of high-current beams are outlined. Also, it is shown that there is a good prospect of handling the heat removal problem in a way compatible with the production of a very large thermal-neutron flux. E.E.B.

N65-28580 Atomic Energy of Canada, Ltd., Chalk River (Ontario).
THE ING RESEARCH FACILITIES

J. C. D. Milton *In its* Symp. on the Generation of Intense Neutron Fluxes [1965] 8 p refs (See N65-28575 17-24) Available from Atomic Energy of Canada, Ltd., Chalk River: $2.00

One of the most attractive features of the Intense Neutron Generator (ING) is the diversity of research facilities that the concept allows. Not only beams of thermal neutrons can be provided, but also beams of neutrons of all energies to 1000 MeV, proton beams of selected energies from thermal to nearly 1000 MeV, and secondary beams of mesons and neutrinos. All these beams would have a quality and intensity far in excess of any facility in existence today. The secondary beams available from ING are tabulated, and a brief indication is given of the types of experiments which can be done with the facilities which will be provided by ING. E.E.B.

N65-28581 Atomic Energy of Canada, Ltd., Chalk River (Ontario). Reactor Physics I Branch.

NUCLEAR POWER IMPLICATIONS OF ING

C. H. Millar *In its* Symp. on the Generation of Intense Neutrol Fluxes [1965] 7 p (See N65-28575 17-24) Available from Atomic Energy of Canada, Ltd., Chalk River: $2.00

The potential sources of nuclear energy are reviewed and the past position of AECL in high-energy nuclear physics is outlined. Also, the potential power applications of high-energy accelerators and the role that the Intense Neutron Generator (ING) could play in this field are discussed. In discussing the many different approaches to using high-energy, high-current accelerators for the production of nuclear power, the following governing facts were noted: (1) The accelerator is basically a device to produce fissile material from fertile material, and thus may be considered only as a useful adjunct to a nonbreeding reactor complex. (2) The accelerator is more wasteful of fertile material than the breeder reactor, but this waste can be reduced and the fisssile output multiplied by the use of a power-producing subcritical assembly in place of a simple nonmultiplying blanket. (3) Nonbreeder reactors may ultimately require an accelerator system to convert fertile material in order to meet demand. (4) The accelerator system can compete economically with the separation plant for producing fertile material. E.E.B.

N65-28582 Atomic Energy of Canada, Ltd., Chalk River (Ontario). Reactor Research Div.

RADIO-FREQUENCY SYSTEM FOR THE INTENSE NEUTRON GENERATOR (ING)

A. G. Ward *In its* Symp. on the Generation of Intense Neutron Fluxes [1965] 7 p refs (See N65-28575 17-24) Available from Atomic Energy of Canada, Ltd., Chalk River: $2.00

The Intense Neutron Generator (ING) will require 65 MW in the proton beam, about 75 MW of RF, and perhaps a minimum of 100 MW of ac power. The rf system will dominate the cost of the machine and most of the operational cost will be for power. The klystron, amplitron, triode, and tetrode are discussed as rf tubes. The requirements for the accelerator are beyond the current state of the art, but are not far beyond present technology. Flash arcs and multifactoring are also discussed. E.E.B.

N65-28583 Atomic Energy of Canada, Ltd., Chalk River (Ontario). Reactor Research Div.

SOME ENGINEERING PROBLEMS WITH AN INTENSE NEUTRON GENERATOR

W. A. Wolfe *In its* Symp. on the Generation of Intense Neutron Fluxes [1965] 7 p ref (See N65-28575 17-24) Available from Atomic Energy of Canada, Ltd., Chalk River: $2.00

Engineering problems are considered for the liquid-metal target, beam focusing, beam transport, beam deflection, rf cavities, magnet design, vacuum systems, and power supplies. It is concluded that the Intense Neutron Generator (ING) can be engineered. Many of the materials for the target will require development. Most of the other systems such as cavities, magnets, and vacuum are only moderate extensions of technology. E.E.B.

N65-28584 Atomic Energy of Canada, Ltd., Chalk River (Ontario). General Physics Branch.

SHIELDING AND ACTIVATION

G. T. Ewan *In its* Symp. on the Generation of Intense Neutron Fluxes [1965] 7 p refs (See N65-28575 17-24) Available from Atomic Energy of Canada, Ltd., Chalk River: $2.00

The intense high-energy proton and neutron beams give rise to two mainshielding problems: (1) bulk shielding of the facility for personnel protection while the machine is operating; and (2) activation of the machine and experimental equipment by scattered protons and neutrons. The activation of the machine and equipment is considered the more important. The two most important considerations regarding this activation are: (1) the level of activation; and (2) the rate of decay of the induced radioactivity. Both are discussed. It was concluded that the most serious problem is that of activation. If the proton accelerator can be designed so that less than 1 microampere of the beam is lost, the machine activation can be handled easily. If about 10 μA is spilled, more sophisticated techniques will be required, and if about 100 μA is spilled the activation problem will be very serious and radiation damage of insulators may become a problem. E.E.B.

N65-28585 Atomic Energy of Canada, Ltd., Ottawa (Ontario).

POSSIBLE NUCLIDE PRODUCTION IN THE INTENSE NEUTRON GENERATOR

D. L. Rowat *In* Atomic Energy of Canada, Ltd., Chalk River Symp. on the Generation of Intense Neutron Fluxes [1965] 7p ref (See N65-28575 17-24) Available from Atomic Energy of Canada, Ltd., Chalk River: $2.00

The production of nuclides by the Intense Neutron Generator (ING) are discussed for the following: (1) the common nuclides currently produced or capable of being produced in reactors; (2) the heavy elements or transplutonium nuclides; (3) neutron-deficient nuclides; (4) spallation products from the proton–neutron target or from beam pumps. Some possibilities for commercial production are illustrated and it appears to seem reasonable that the ING can provide commercial products with new areas of revenue. E.E.B.

N65-28609# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

NUCLEAR MAGNETOMETER

W. Zbieranowski and J. Sass 12 Apr. 1965 13 p refs Transl. into ENGLISH from Przegl. Elektron. (Poland), no. 2, 1964 p 74–82

(FTD-TT-64-1104/1+2; AD-460317)

General principles and conditions are given for measuring a magnetic field with the aid of a nuclear magnetometer. The high frequency generator, resonance circuit, quartz crystal, and other elements of the system are discussed; and an analysis was made of the measuring accuracy of the instrument. The arrangement of the component parts is shown, and the circuitry of the generator components is given. L.S.

N65-28610# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

A STRONG-CURRENT HIGH-VOLTAGE SOURCE FOR A NEUTRON GENERATOR

H. Beine and A. Peil 12 Apr. 1965 7 p refs Transl. into ENGLISH from Exptl. Tech. Physik (W. Berlin), no. 2, 1964 p 113–115
(FTD-TT-64-1124/1+2; AD-462439)

A high-voltage source for a neutron generator is described. The circuit is shown, and the characteristics of the device are given. Ion currents up to several milliamps are realizable. Insulation and corona losses are negligible, and in contrast to the Van De Graaff accelerator, the neutron yield from the deuteron–tritium reaction is not limited by the current intensity of the high-voltage generator. The high voltage was measured as a function of the primary and secondary voltage with a current load of about 2.5 mA. E.E.B.

N65-28679# Raytheon Co., Waltham, Mass. Research Div.
HIGH POWER MICROWAVE FERRITES AND DEVICES Final Report, 1 Jan. 1963–31 Dec. 1964
E. Schlömann, J. J. Green, J. H. Saunders, E. A. Maguire, A. E. Paladino et al [1964] 157 p refs *Its* Rept.-8
(Contract DA-36-039-AMC-00064(E))
(S-742; AD-615754)

The theory of spin-wave generation in nonuniform magnetic fields is reviewed. Detailed theoretical results concerning the photon–magnon conversion, the magnon–phonon conversion, the frequency- and field-dependence of the delay time, and the insertion loss are presented. A general theory of the nonuniform demagnetizing field of nonellipsoidal samples is described. Experimental results concerning the field dependence of the delay time are presented both for the case in which the spin waves generated are exchange dominated and the case in which they are dominated by the magnetostatic interaction. The insertion loss was found to vary with the applied magnetic field in an approximately periodic fashion showing two distinct periods of the order of 1 Oe and 100 Oe. The fast variation (period approximately 1 Oe) has been definitely identified as arising from the excitation of magnetoelastic resonances in the nonuniform magnetic field near the endfaces of the sample. The slow variation (period approximately 100 Oe) is tentatively attributed to the interference of different partial waves arising from the reflection of the primary wave at the sidefaces of the sample. Author

N65-28693# Atomics International, Canoga Park, Calif.
CURIE-DOSE-THUNDERHEAD: A DIGITAL COMPUTER PROGRAM FOR EXTERNAL AND INTERNAL RADIATION DOSE CALCULATIONS
G. P. Kenfield, W. R. Lahs, W. B. Sayer, R. M. Mac Adams, and N. A. Harris 15 Jun. 1965 40 p refs
(Contract AT(11-1)-GEN-8)
(NAA-SR-8884) CFSTI: $2.00

The CURIE-DOSE-THUNDERHEAD program is a combination of three basic computer programs employed in succession. The first, CURIE, calculates the fission product buildup and decay as a function of reactor operating time, operating power, and decay time. The second, DOSE, uses the fission product inventory obtained from CURIE to calculate the dose to 14 internal body organs due to inhalation of fission products released to the atmosphere. The third, THUNDERHEAD, also uses fission product activity data from CURIE to calculate the external cloud gamma exposure from the released fission products. Author

N65-28834# Atomic Energy Establishment, Winfrith (England). General Reactor Physics Div.
TEMPO—A GENERAL DOPPLER BROADENING PROGRAMME FOR NEUTRON CROSS-SECTIONS
K. Gregson and M. F. James Feb. 1965 13 p refs
(AEEW-M-518) HMSO: 2s

TEMPO is a computer program written in Fortran II for the IBM 7090, and calculates the Doppler broadened total, scattering, capture and fission cross sections of a material at a given temperature from tabulated values of the unbroadened cross sections. The broadening is achieved by numerical quadrature in the monatomic gas model. The cross sections may have any shape, and the energy points may be arbitrarily placed; but each cross section must be specified at the same energy points, and the broadened data will also be computed at these energies. R.N.A.

N65-28836# Atomic Weapons Research Establishment, Aldermaston (England).
A REVIEW OF EVALUATIONS OF NEUTRON CROSS SECTIONS AVAILABLE AT NOVEMBER 1964
K. Parker Mar. 1965 39 p refs
(AWRE-0-13/65) HMSO: 5s 6d

A survey of published papers and reports on neutron cross section evaluations from all ENEA member countries, and other countries, laboratories, and organizations is presented. Data for particular elements, isotopes, and compounds are assessed. Available neutron cross section evaluations are tabulated. R.N.A.

N65-28891# Rochester Univ., N. Y. Dept. of Physics and Astronomy.
NONCOVARIANCE OF THE DIRAC MONOPOLE
C. R. Hagen 7 May 1965 26 p refs Submitted for Publication
(Contract AT(30-1)-875)
(UR-875-85)

Starting from the equations which express the divergence of the Maxwell field tensor and its dual in terms of the electric and magnetic current densities, a field theory of the Dirac magnetic monopole is constructed. It is shown that such a theory is necessarily incompatible with the requirement of Lorentz invariance if the usual number of degrees of freedom of the electromagnetic field is to be preserved. It is further demonstrated by an explicit construction of the generators of spatial rotations that, independent of the question of Lorentz invariance, the usual argument for the quantization of magnetic charge is not consistent with rotational invariance. A soluble field theoretical model is given which clearly displays the difficulties of Lorentz invariance inherent to any theory of the Dirac monopole. The mass spectrum of the Maxwell field in this model is shown by direct calculation to be explicitly noncovariant if and only if both the electric and magnetic couplings are nonvanishing. Author

N65-28892# Rochester Univ., N. Y. Dept. of Physics and Astronomy.
PRODUCTION AND ABSORPTION OF S-WAVE PIONS AT LOW ENERGY BY TWO NUCLEONS
D. S. Koltun and A. Reitan 21 Jun. 1965 30 p refs Submitted for Publication
(Contract AT(30-1)-875)
(UR-875-88)

The cross sections for the reactions $p + p \rightarrow d + \pi^+$ and $p + p \rightarrow p + p + \pi^0$ are calculated for s-wave pions at threshold. The pion is produced by either nucleon and emitted directly or rescattered in an s-wave by the second nucleon, through a modified static interaction. The two nucleons interact through a phenomenological potential. For the Hamada-Johnston potential both calculated cross sections agree with experimental results. Application of the method of calculation to the nuclear absorption of s-wave pions is discussed. Author

N65-28904# United Kingdom Atomic Energy Authority, Harwell (England). Nuclear Physics Div.
LOW ENERGY NEUTRON INELASTIC SCATTERING EXPERIMENTS WITH A LINEAR ACCELERATOR
F. J. Webb Apr. 1965 47 p refs
(AERE-R-4263) HMSO: 7s

Linear accelerators are able to provide high neutron fluxes and to extend inelastic scattering measurements up to 1 eV or higher. Four methods are considered, employing a linear accelerator as neutron source in combination with a crystal analyzer, a filter analyzer, a crystal monochromator, and mechanical monochromator. Of these methods the last yields the highest resolution, and allows speedy collection of data. The crystal analyzer method is simpler, but is slower in collecting data. The filter analyzer method is a simple experiment, but the data which can be obtained is limited. Author

N65-28911# California Univ., Berkeley. Lawrence Radiation Lab.
STUDIES OF ATOMIC HYDROGEN AT LOW PRESSURES
Peter R. Rony 20 Apr. 1965 225 p refs
(Contract W-7405-ENG-48)
(UCRL-16050) CFSTI: $6.00

Subjects concerned with the gas and surface phase kinetics of atomic hydrogen at low pressures are presented. It is experimentally shown that a water cooled Wrede-Harteck gauge capable of detecting atom concentrations of less than 0.06% at 75 mtorr, may not be absolute, is sensitive to H_2O and HCl, is susceptible to thermal effusion problems, and cannot discriminate between atomic hydrogen or oxygen. Small amounts of H_2O do not influence the atomic hydrogen yield from a microwave or electrodeless discharge at 75 mtorr. Small amounts of O_2 stoichiometrically increase the yield of atomic hydrogen from the low pressure discharge by a ratio of at least two atoms of hydrogen per molecule of oxygen. A cyclotron resonant microwave discharge is a convenient method for producing an electrical discharge in the low pressure system with a microwave power as low as 250 mW. The location of an active catalytic probe affects the atom concentration level throughout a diffusion tube or flow tube at low pressures. R.N.A.

N65-28914# Atomic Energy Information Service, Frankfurt am Main (West Germany).
AED INFORMATION SERVICE; SERIES C: BIBLIOGRAPHIES. SECTION 23: HIGH ENERGY PHYSICS, NO. 03
K. Mellentin and I. Vierk, comp. Oct. 1964 133 p refs
(AED-C-23-03)

N65-28923# Philipps-Universität, Marburg (West Germany). Institut für Theoretische Physik.
APPROACH TO ELECTRON–PION SCATTERING
H. D. Doebner and D. Simon [1964] 24 p refs
(Contract AF 61(052)658)
(AFOSR-65-0649; AD-614843)

Quantum electrodynamics and the resonance structure of the pion is shown to provide a method for the discussion of electron–pion scattering along the same lines as strong interaction theory. The double spectral functions are constructed from a system of integral equations in a strip approximation, and corrections are calculated for the one-photon exchange amplitude, expressed by integrals over the imaginary part of the form factor in the annihilation channel. In order to achieve results which are not available from second order perturbation theory, at least the second step of the strip approximation or inelastic processes must be discussed. The first step strip approximation is not expected to give an essential correction to the one-photon exchange amplitude. E.E.B.

N65-28927# Laboratoire de Physique Theorique et des Hautes Energies, Orsay (France).
DEUTERON ELECTRODISINTEGRATION AND NEUTRON FORM FACTORS
M. Gourdin, M. Le Bellac, F. M. Renard, and J. Tran Thanh Van May 1965 8 p refs
(TH-98)

The main features of a fully constructed relativistic and gage invariant theory for calculations on deuterium electrodisintegration are discussed. This covariant theory is essentially an extension of a previous work on deuterium photodisintegration. The covariant theory discussed appears to be well adapted to the electrodisintegration process in the range of momentum transfer $0 \leq q^2 \leq 20 f^{-2}$. The complete spectra is also fitted by these calculations. An example is presented. N.E.A.

N65-28941# Nihon Univ., Tokyo (Japan). Dept. of Physics.
DEFORMABLE SPHERE MODEL OF ELEMENTARY PARTICLES AND THE ORIGIN OF INTERNAL SYMMETRIES
Osamu Hara and Tetsuo Goto [1965] 24 p refs
(NUP-65-7)

Deformable sphere model of elementary particles is discussed as a generalization of the rigid body model. It is shown that in this model the approximate SU(3) symmetry follows very naturally. Author

N65-28977# Brookhaven National Lab., Upton, N. Y. Neutron Cross Section Evaluation Group.
OPTICAL MODEL ANALYSIS OF ELASTIC AND INELASTIC SCATTERING OF NEUTRONS BY ALUMINUM IN THE MeV REGION
S. O. Moore Jun. 1965 14 p refs
(BNL-927(T-383)) CFSTI: $1.00

A spherical optical potential model for a light mass deformed nucleus was used to calculate for Al^{27} the total cross section, the differential elastic cross section, inelastic scattering cross section, and the differential inelastic cross section. The calculated results were compared with the experimental data. The calculated results compare favorably with the experimental values for the model which was used for these calculations. E.E.B.

N65-28978# Brookhaven National Lab., Upton, N. Y.
ORIENTED NUCLEI
Vance L. Sailor 14 Oct. 1964 18 p refs *Its* Brookhaven Lecture Series No. 40
(BNL-903(T-369)) CFSTI: $1.00

This lecture covers a wide range of subjects: why oriented nuclei are of interest; how oriented nuclei are used in experiments; how nuclear spin provides the mechanism for achieving nuclear orientation; how the nucleus behaves under the influence of a magnetic field; the details of static polarization produced by thermodynamic equilibrium; the necessity for working at very-low temperatures; and how nuclear polarization is used in a neutron experiment. The experimental arrangement of the neutron spectrometer for transmission measurements, and the relation to these measurements to the nuclear and neutron polarization are discussed in detail. E.E.B.

N65-28983# California Univ., Livermore. Lawrence Radiation Lab.
PION–PROTON INELASTIC DATA
R. L. Rosenberg and L. D. Roper 21 May 1965 18 p refs
(Contract W-7405-ENG-48)
(UCRL-14202) CFSTI: $1.00

Tables of $\pi^+ + p$ and $\pi^- + p$ total and partial inelastic cross sections known in August, 1964 are listed up to ~1 BeV. The good agreement between the London-Livermore π-p phase shifts and the total inelastic cross sections is shown. Author

N65-29043# Atomic Weapons Research Establishment, Aldermaston (England).
THE CALCULATION OF GROUP AVERAGED NEUTRON CROSS SECTIONS: GALAXY 3 FACILITIES AVAILABLE IN S2 (FORTRAN) LANGUAGE FOR THE IBM7030 (STRETCH) COMPUTER
W. M. M. Kerr, K. Parker, and D. V. J. Williams Mar. 1965 74 p refs
(AWRE-O-97/64)

Processing of BCD tapes generated by the IBM7090 version of GALAXY to give input tapes for the neutronics programmes STRAINT (one dimensional S_n transport theory), TURTLE (two dimensional S_n transport theory) and DUNDEE (perturbation theory) is described. The format of these input tapes and of the BCD tape are given in detail and the facilities of combination, condensing, mixing, adjustment and substitution which can be applied to calculated group cross sections are described. An overall flow diagram and input instructions are given. Author

N65-29044# Wisconsin Univ., Madison. Theoretical Chemistry Inst.
LONG-RANGE INTERACTION OF TWO ls-HYDROGEN ATOMS EXPRESSED IN TERMS OF NATURAL SPIN ORBITALS
J. O. Hirschfelder and P. O. Löwdin (Uppsala Univ.) 29 Apr. 1965 12 p refs
(Contract AF 33(616)-3414)
(WIS-TCI-92; AD-615268)

A numerical error was discovered in the calculations of the inverse eighth power dispersion energy, B(sub 8)/R to the 8th power, as reported earlier ('Molecular Physics' 2:229 (1959)). The corrected result agrees with the value of Pauling and Beach ('Phys. Rev.' 47:686 (1935)). TAB

N65-29067 European Organization for Nuclear Research, Geneva (Switzerland).
THEORETICAL PROBLEMS IN STRONG INTERACTIONS AT HIGH ENERGIES LECTURE NOTES
K. Dietz, V. Müller, and C. Wilkin 4 Jun. 1965 108 p refs
(CERN-65-22)

Phenomena of strong interaction fields at high energies is discussed in terms of quantum mechanics and symmetry properties. Collisions of strong interacting particles such as mesons and baryons are considered. Problems discussed include inelastic two-body collisions in terms of exchanged quantum numbers; analytical properties of scattering amplitudes for high energy scattering; and elastic scattering as the shadow of inelastic collisions. L.S.

N65-29070# Stanford Univ., Calif.
ELECTROMAGNETIC FORM FACTORS
T. A. Griffy and L. I. Schiff [1965] 105 p refs Submitted for Publication
(Contracts AF 49(638)-1389; Nonr-225(67))
(ITP-155; HEPL-363; AD-615500)

Electromagnetic form factors are studied to provide a quantitative description of the interactions between elementary particles and an arbitrary electromagnetic field. Elastic electron scattering experiments are interpreted, and the theory that is needed to extract the form factors from the elastic nucleon scattering cross sections is developed. Also discussed is the relation between nucleon form factors and the scattering from hydrogen, deuterium, tritium, and He^3; and pion production by electron impact and determination of the pion form factor. Sketches of particle interactions are shown, using dark, solid, wavy, broken, and other types of symbols for portraying what is happening in the interaction. L.S.

N65-29076# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CERTAIN PROBLEMS OF MASS SPECTROSCOPY AND THE SPECTROSCOPY OF ATOMIC NUCLEII
W. Zuk 27 May 1965 24 p refs Transl. into ENGLISH from Postepy Fiz. (Poland), v. 14, no. 6, 1963 p 703–716
(FTD-TT-64-1368/1+2+3+4; AD-466196)

Research problems in mass spectroscopy and spectroscopy of atomic nuclei, conducted at the Department of Experimental Physics at the Marie Curie Sklodowskiej University, are surveyed. Mass spectrometry techniques are used for investigating ionization phenomena occurring in gases under the influence of factors such as electron bombardment, ion bombardment, collisions with neutral atoms, and for photoionization phenomena. Other uses for mass spectrometry methods such as quantitative analysis of components of gaseous mixtures, kinetic studies, isotopic studies, and determinations of molecular structure are also reviewed. L.S.

25 PHYSICS, PLASMA

Includes magnetohydrodynamics. For applications see: 28 Propulsion Systems.

N65-28073 Joint Publications Research Service, Washington, D. C.
ON AN OSCILLATORY MECHANISM POSSIBLE IN MAGNETOHYDRODYNAMICS
V. M. Kuznetsov *In its* Eng. J. 29 Jun. 1965 p 215–220 refs (See N65-28050 17-23) CFSTI: $6.00

The processes of self-excitation of magnetic fields in gases are studied. The theoretical model chosen to reflect these processes specifies a conducting medium which moves without friction through a duct and which has properties resembling a solid plasma. The model is further elaborated by adding a system of differential equations which are functions of velocity, current in the loop, and the acceleration determined by the force of the medium. These equations are used in developing functions which can facilitate finding the aerodynamic characteristics of vehicles which use magnetic self-generation as a decelerating system for reentry into the earth atmosphere. J.M.D.

N65-28339# Aeronautical Research Council (Gt. Brit.)
THE MOVEMENT OF HIGH-CURRENT ARCS IN TRANSVERSE EXTERNAL AND SELF-MAGNETIC FIELDS IN AIR AT ATMOSPHERIC PRESSURE
H. C. Spink and A. E. Guile (Leeds Univ.) Supersedes ARC-25930 London, HMSO, 1965 98 p refs
(ARC-CP-777; ARC-25930) HMSO: 17s 6d

The velocities of arcs moving between electrodes 1.6 mm to 10 cm apart with undirectional current flow of up to 20,000 A, in transverse magnetic fields of up to 0.13 Wb/m^2, and of similar arcs moving in the magnetic field due to the

current flowing in the electrodes, have been measured in air at atmospheric pressure. The track on the cathode surface has been found to be almost entirely continuous over the whole of this range on a variety of metals, and it is shown that the cathode surface and material have had a considerable influence on the movement of the shorter arcs. At the same time the anode has now been shown to have an appreciable effect under some conditions. There is evidence which suggests that at the velocities now reached (up to about Mac. 0.8), the aerodynamic retarding forces on the arc column restrict the velocity to a value below that which cathode processes could allow. For the longer arcs the electrodes have relatively little effect on the motion which is governed by column processes. Author

N65-28353# Stanford Univ., Calif. Microwave Lab.
NOISE AND CORRELATION STUDIES OF MICROWAVE RESONANCES OF A PLASMA COLUMN IN A MAGNETIC FIELD Supplementary Technical Report
G. N. Oetzel Oct. 1964 155 p refs
(Contract AF 49(638)-1321)
(ML-1245; AFOSR-64-2494; AD-615553)

Recent observations of strong resonances at the harmonics of the electron cyclotron frequency in the noise emission from low temperature plasmas have raised the question of whether the harmonics were being generated in the volume of the plasma or in the sheath. Conclusive evidence is presented that the observed harmonic effects can be explained satisfactorily in terms of electrostatic oscillations in the plasma volume, and that they cannot be explained in terms of effects in the sheath. Good agreement with the calculated dispersion relation for the electrostatic oscillations was obtained in noise measurements. Transmission parallel to the magnetic field and plasma column was observed. The noise signals generated by heating the column in the fundamental and second harmonic modes were observed to propagate along the magnetic field and plasma column. Observations of noise emission, wave propagation, and resonances in modes other than the cyclotron harmonic modes are also presented. A theoretical discussion of the two-frequency correlation experiment and a further exploration of its experimental properties are given. Author

N65-28488# Commissariat a l'Energie Atomique, Saclay (France).
LAGRANGIAN FORM FOR A MULTI-FLUID SYSTEM IN ELECTROMAGNETIC INTERACTION [FORMALISME LAGRANGIEN POUR UN SYSTEME DE PLUSIEURS FLUIDES EN INTERACTION ELECTROMAGNETIQUE]
M. Vuillemin Brussels, EURATOM, 1965 17 p refs In FRENCH; ENGLISH summary
(Contract EURATOM-007-62-1 FUAF)
(CEA-R-2608; EUR-1915-f) Available from Belg. Am. Bank and Trust Co., New York, Account No. 22.186: 25 Belg. Fr.

After a recapitulation of the Lagrangian expression for a conductive fluid in an external electromagnetic field, a Lagrangian is shown to exist to describe the evolution of a system of interacting fluids obtained by superimposition of the Lagrangian of each fluid and that of the electromagnetic field. By variation, the fluid movement equations are obtained combined with the Maxwell equations. It is shown that the study of the minor movements around a stationary state is derived from the Lagrangian developed to the second order of the perturbation. The equations for the normal modes can then be found and the stability studied by seeking the marginally stable modes. Author

N65-28489# Commissariat à l'Energie Atomique, Fontenay-aux-Roses (France).
DETERMINATION OF THE PHYSICAL VALUES OF A PLASMA PUFF BY ANALYSIS OF THE DIAMAGNETIC SIGNALS. PART I: EXPANSION MODEL FOR THE PUFF. PART 2: COMPARISON OF EXPERIMENTAL RESULTS WITH THE EXPANSION MODEL FOR THE PLASMA PUFF [DETERMINATION DES GRANDEURS PHYSIQUES D'UNE BOUFFEE DE PLASMA PARL'ANALYSE DE SIGNAUX DIAMAGNETIQUES. PREMIERE PARTIE: MODELE D'EXPANBOUFFEE DE PLASMA PAR L'ANALYSE DE SIGNAUX DIAMAGNETIQUES. PREMIERE PARTIE: MODELE D'EXPANSION DE BOUFFEE. DEUXIEME PARTIE: CONFRONTATION DES RESULTATS EXPERIMENTAUX ET DU MODELE D'EXPANSION DE LA BOUFFEE DE PLASMA]
J. Jacquinot, C. Leloup, F. Waelbroeck and J. P. Poffe Brussels, EURATOM, 1965 48 p refs In FRENCH; ENGLISH summary
(Contract EURATOM-007-62-1 FUAF)
(CEA-R-2617; EUR-1916.f) Available from Belg. Am. Bank and Trust Co., New York, Account No. 22.186: 70 Belg. Fr. ENGLISH summary

The flow of a dense plasma puff along the axis of a uniform magnetic field is examined, assuming the following hypotheses: the axial distribution of the line density can be described at any time by a gaussian function whose characteristic parameter is independent of the distance from the axis of the system: the β ratio is less than 0.6. An approximate solution of the magnetohydrodynamics equations is obtained. The evolution of the characteristic properties of the plasma (local velocity, temperature and density) can be calculated from a set of equations involving 5 plasma parameters. A method leading to the determination of these parameters is described. It uses 5 informations picked up from the diamagnetic signals induced by the plasma into a set of 4 compensated magnetic loops. Author

N65-28498# France. Office National d'Etudes et de Recherches Aerospatiales, Chatillon-sous-Bagneux.
INTERACTION OF REENTRY PLASMA AND ELECTROMAGNETIC WAVES [INTERACTION DES PLASMAS DE RENTREE ET DES ONDES ELECTROMAGNETIQUES]
Jacques Dorey [1964] 15 p In FRENCH Presented at la Reunion sur les Equipements des Champs de Tir, CERES, 22 Sep. 1964
(ONERA-TP-167(1964))

This report describes reentry plasma in terms of density and frequency of collision per second between electrons and neutral molecules, transversal radioelectric wave transmission in terms of the ratio of frequency of collision and plasma oscillation, and longitudinal waves in a plasma. It is found that longitudinal waves varying or constant with time can be propagated without an associated magnetic field. Also longitudinal waves with a transversal magnetic field can be propagated under certain conditions. Several methods are then suggested for further study of electromagnetic plasma interaction among which are Langmuir probes, dipole radiation, diagrams of radar radiation, and the study of the radiation spectrum of shock waves. Trans. by J.G.

N65-28524# Air Force Cambridge Research Labs., Bedford, Mass. Microwave Physics Lab.
ON THE IMPEDANCE METHOD FOR MEASURING HIGH ELECTRON DENSITY AND ELECTRON COLLISION FREQUENCY IN A GASEOUS PLASMA COLUMN Physical Sciences Research Papers No. 106
Denis M. Coffey May 1965 29 p refs
(AFCRL-65-324; AD-616121)

An analysis of a microwave impedance method for measuring electron density and effective electron collision frequency

in a plasma column is reviewed. It is evident from laboratory observations that surface polarization effects may be present in the impedance method. Such a consideration alters the form of the usual expression for the complex dielectric constant of an ionized gas. Author

N65-28527# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
THE DETERMINATION OF SPATIALLY NON-UNIFORM ELECTRON DENSITY DISTRIBUTION
Kurt A. Graf Apr. 1965 131 p refs
(Grants AF-AFOSR-366-63; AF-AFOSR-366-64)
(UTIAS-108; AFOSR-65-0935; AD-616614)

Electron densities have been measured in the subsonic portion of a free-expansion argon jet by microwave and Langmuir probe methods. The electron density in the jet had a Gaussian radial distribution; along the axis of the jet the density fell off approximately exponentially. Microwave measurements were made by traversing the microwave beam across the jet. This allowed the spatial variation of electron density to be determined. The data were analysed with a ray-tracing technique. Langmuir probe measurements were made with cylindrical and flat probes under essentially collision free conditions and over a range of probe radius to Debye length ratios of about 10 to 50. Both electron and ion collection were measured and analysed. The probe data agreed very well with the microwave data. Author

N65-28656# General Electric Co., Philadelphia, Pa. Space Sciences Lab.
STATIONARY CURRENT SHEET MODEL FOR PLASMA ACCELERATION
F. W. Mezger May 1965 19 p refs
(R65SD21; AD-615606)

Difficulities with the usual circuit-current sheet model of the coaxial plasma accelerator are shown to arise in the case of a stationary current sheet. A suggestion for resolving these difficulities is made based on considering energy and momentum changes of the plasma moving through the current sheet. The resulting equations are confirmed by a detailed analysis of the circuit elements made up of the moving plasma within the current sheet. Author

N65-28662# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON THE SEPARATION OF A MAGNETOHYDRODYNAMIC BOUNDARY LAYER
A. Tsinober, A. Shtern, and E. Shcherbinin 5 May 1965 13 p refs Transl. into ENGLISH from Latvijas PSR Zinatnu Akad. Vestis (Riga), no. 12, 1963 p 49–56
(FTD-TT-65-27/1+2; AD-615530)

An attempt is made to experimentally and theoretically consider the question of the effect of a transverse magnetic field on the position of the separation point of a laminar boundary layer. The results of experiments to determine such an effect is presented. A solution to the problem of the effect of a magnetic field on the development of a boundary layer is given. The question of the probability of approximating the conditions of the experiment is posed. N.E.A.

N65-28699# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ATTACK ON PLASMA, TEMPERATURE OF 100 MILLION DEGREES
V. Davydchenkov 11 May 1965 5 p Transl. into ENGLISH from Nedelya (Moscow), 19 Sep. 1964 p 9
(FTD-TT-65-448/1; AD-615535)

Experimental installations concerning the physics of plasma are reported to have been built by scientists of the Siberian Institute of Nuclear Physics. R. Sagdeyev obtained plasma by passing shock waves at 1000-km/sec velocity so that plasma was heated to 100 million degrees and retained for so long as several hundred thousands of fractions of a microsecond. Yu. Nesterikhin and his associates measured the temperature of plasma by using an optical interferometer. B. Chirikov and V. Volosov are searching for ways to control thermonuclear reactions; such control might be attained by having plasmas with electrons travelling at a velocity almost equaling the speed of light. The investigators F. Tsel'nik, V. Pal'chikov and B. Chirkov used ultrahigh vacuum for overcoming instability of plasma. The magnetic trap 'IN' was intended to carry out experiments with relatively slow electrons at a velocity of 150,000 km/sec and temperature down to one billion degrees. Author

N65-28798# Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
A KINETIC THEORETICAL INVESTIGATION OF A FULLY IONIZED GAS. PART II: SOME ASPECTS OF MULTIPLE COLLISIONS
Toyoki Koga Jan. 1965 82 p refs
(Contract Nonr 893(38))
(PIBAL-863; AD-464742)

The Brownian motion of a test body due to multiple interactions with field particles is investigated within or almost within the framework of Markoff's processes. First, Markoff's processes are studied as presenting such multiple interactions. Based on the study and by means of Markoff's method of random flights, we investigate the Brownian motion of an elastic test body submerged in a rarefied gas constituted of elastic molecules, under the condition that *mutual interactions among field particles are negligible*. It is shown that there is no difference in effect between temporal repetitions of random binary collisions and multiple collisions (random binary collisions superposed at one moment of time), *so far as the friction and diffusion of the test body in momentum space are concerned*. The situation is similar when a test body with electric charge is submerged in an electron gas, *if* the mutual interactions among electrons are ignored. It is not feasible, however, to ignore those mutual interactions of field electrons and to represent electronic multiple interactions by temporal repetitions of random binary interactions, each of which takes place independently: Fluctuations of limitlessly large amplitudes in the spatial distribution of electrons, which may possibly take place in this approximation, do not seem realistic, because a limitless concentration of potential energy accompanying a concentration of electrons in a local spot cannot be permitted. Amplitudes of such fluctuations and/or microscopic disturbances must have a certain maximum limit. The situation does not change even when the interaction force law is of the Debye-Huckel type. A kinetic theoretical scheme of treating fully ionized gas in light of this fact is proposed. Author

N65-28809# Joint Publications Research Service, Washington, D. C.
A STUDY OF THE PROPERTIES OF A THERMIONIC DIODE PLACED IN AN AUTONOMOUS DISCHARGE PLASMA
N. D. Morgulis et al 13 Jul. 1965 11 p refs Transl. into ENGLISH from Atomnaya Energ. (Moscow), v. 18, no. 5, May 1965 p 447–451
(JPRS-31048; TT-65-31546) CFSTI: $1.00

The authors study the physical properties of the thermionic diode when placed in an autonomous discharge plasma in cesium and mercury pairs. It is shown that it is possible to obtain increased emf and diode output voltage by this means, the

governing factor being the temperature of the plasma electrons. A measurement is made of the distribution of the parameters of the mercury plasma in the interelectrode space of a similar diode. On the basis of the results obtained certain conclusions are reached. Author

N65-28840# Minnesota Univ., Minneapolis. Plasma Physics Lab.
STUDY OF COLLISION PROCESSES IN GASEOUS PLASMAS Semiannual Technical Report, Jul. 1964–Jan. 1965
H. J. Oskam, ed. Mar. 1965 19 p
(Contract Nonr-710(37))
(SATR-3; AD-614923)

The major portion of the report is comprised of a detailed description of the SLEMA II (Simultaneous Light Emission, Absorption and Mass Analysis) measuring system. The system is designed to measure simultaneously on the same gaseous plasma the time dependence of the number density of electrons, positive and negative ions, and metastable atoms and molecules, while also the intensity of spectral lines and bands can be determined. Summaries are given of results obtained with the SLEMA I system and of a redesign of the auxiliary electronics for an ion mobility measuring tube. Author

N65-28877*# United Aircraft Corp., East Hartford, Conn. Research Labs.
INVESTIGATION OF COLLISION PROBABILITY OF ELECTRONS AND IONS WITH ALKALI METAL ATOMS Semiannual Report, Oct. 22, 1964–May 11, 1965
R. H. Bullis and W. L. Nighan 29 Jul. 1965 86 p refs
(Contract NAS3-4171)
(NASA-CR-54451; UACRL-C-920243-12) CFSTI: HC $3.00/MF $0.75 CSCL 20I

A cesium discharge was used to determine the collision probability of electrons with cesium atoms over the energy range from 0.2 to 0.6 eV. Also, cesium ion–cesium atom collision probability measurements were made in the modified Ramsauer beam experiment in an attempt to extend the energy range of these measurements below 0.1 eV. Ion beam energy distributions were obtained at 0.1 eV and preliminary collision cross-section data are reported. E.E.B.

N65-28964# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics
ON THE HYDROMAGNETIC STABILITY OF A LIQUID LAYER UNDER THE ACTION OF A MAGNETIC FIELD AND A GRAVITATIONAL FORCE Technical Report No. 11
José Luis Urrutia and I-Dee Chang Feb. 1965 62 p refs
(Contract Nonr-225(30))
(SUDAER-218; AD-614645)

The dissertation is concerned with an analytical study of the stability of an electrically conducting liquid layer subjected to a gravitational field and a magnetic field. The main purpose of the investigation is to determine the effect of a magnetic field on the stability criteria of the layer. TAB

N65-28982# California Univ., Livermore. Lawrence Radiation Lab.
BEAM TRAJECTORIES UNDER THE INFLUENCE OF SELF-FIELDS AND EXTERNAL FOCUSSING ELEMENTS
J. W. Beal 21 May 1965 10 p refs
(Contract W-7405-ENG-48)
(UCRL-14194) CFSTI: $1.00

The general, relativistic equations for the trajectory of a charged particle in an electromagnetic field of axial symmetry are derived from the principle of least action. Self-field effects are included. Under the proper assumptions the general results are shown to reduce to the well-known paraxial ray equation including self-field terms. A computer program is described which numerically integrates the differential equation to obtain the trajectory under the influence of the self-fields as well as the external fields. The results demonstrate the effectiveness of the focussing elements as a function of particle energy, beam current, and initial beam slope and radius. The results presented are for electron beams; the conversion to ion beams is obvious. Author

N65-28999# New York Univ., N. Y.
CODING AND USE OF INFORMATION IN PROBLEM SOLVING Annual Progress Report, 1 Jun. 1964–31 May 1965
Murray Glanzer 31 May 1965 16 p refs
(Contract DA-49-193-MD-2496)
(AD-463786)

The report describes work completed and in progress on the encoding and storage mechanisms used by human subjects. Experiments are described in the areas of encoding of perceptual information and the storage of verbal materials. The work on the encoding of perceptual information was concerned with extending the application of the verbal loop hypothesis. It consisted of the following: 1) Analyses of the relation between verbalization length and figure difficulty for a variety of sets of dot-patterns; 2) Evaluation of the effect of encoding training on perceptual performance; and 3) Examination of the effects of post-stimulus delay. The work on storage of verbal materials was concerned with the role of intralist recitation and its relation to mnemonic organizing factors in free recall situations. Author

N65-29000# Boeing Scientific Research Labs., Seattle, Wash.
SOME RELATED PHENOMENA IN PLASMAS IN SOLIDS AND IN GASES
James E. Drummond Mar. 1964 39 p refs
(DI-82-0419)

Examples of plasma phenomena in solids which are related to those in gases are reviewed, and it is shown that recognition of these relationships has extended plasma research and enlarged the area of plasma applications. The development of two examples of related phenomena in plasmas in gases and in solids is considered in detail. The pinch effect is discussed as another example of phenomena in electron-hole plasmas that has a bearing on fusion research. Also, the effects of instabilities and the stabilizing effects of the proper sign of magnetic field curvature are shown to be easily detected for plasmas in solids. E.E.B.

N65-29003# Miami Univ., Coral Gables, Fla. Dept. of Physics
MAGNETOFLUIDDYNAMIC VORTICES: CREATION AND INTERACTION
Robert Benach Jun. 1965 65 p refs *Its* Plasma Phys. Bull., v. 5, no. 2
(Contract AT(40-1)-3293; Grant AF-AFOSR-844-65)

Interest in magnetofluiddynamic vortex structures has led to an investigation of the creation and interaction of these structures. This paper considers vortex creation and interaction for a case of axially symmetric and colinear flow in an incompressible fluid, securing explicitly the vorticity creation terms. Author

N65-29055# Deutsche Versuchsanstalt fur Luft- und Raumfahrt, Stuttgart (West Germany).
DETERMINATION OF PLASMA COMPONENTS IN HYDROGEN AND HELIUM [BERECHNUNG DER PLASMAKOMPONENTEN IN WASSERSTOFF UND HELIUM]

J. Artmann and W. L. Bohn Mar. 1965 45 p refs In GERMAN; ENGLISH summary
(DLR-FB-65-10; DVL-380) Available from Zentralstelle für Luftfahrtdokumentation und Inform. (ZLDI), Munich: 15 DM

Determination of the plasma components and their internal partition function is of greatest importance for any further evaluation. In this report, a quick analytical method according to FRIE is applied by means of an electrical computer for determining the plasma components in hydrogen and helium, taking into account the reduction of the ionization potential and cutoff of the internal partition function of the atoms. The latter has practically no effect on the plasma components. Only in the case of hydrogen-like components the values tend to be higher at increased temperatures than those obtained with constant internal partition function. The results are illustrated by numerous diagrams. Author

N65-29056# United Kingdom Atomic Energy Authority, Culham (England). Culham Lab.
CULHAM LABORATORY STUDY GROUP ON PLASMA WAVES, SEPTEMBER 21–25 1964
P. F. Little, A. N. Dellis, A. Paton, and M. J. Parkinson 1965 45 p refs
(CLM-R-42) HMSO: 5s 6d

Abstracts are presented on subjects discussed at the conference covering low-frequency and high-frequency waves, collisionless phenomena, and nonlinear phenomena. E.E.B.

N65-29057# Princeton Univ., N. J. Plasma Physics Lab.
THE TRANSVERSE ELECTRICAL CONDUCTIVITY OF A TOROIDAL PLASMA
S. Yoshikawa Jul. 1965 15 p refs
(Contract AT(30-1)-1238)
(MATT-346)

The plasma conductivity perpendicular to the magnetic field due to the presence of neutrals in a toroidal geometry was calculated classically. It was shown that the conductivity of a toroidal plasma perpendicular to the magnetic field must be increased by the factor $(1 + 8\pi^2/\iota^2)$ over that calculated from a straight magnetized plasma. Here ι is the rotational transform. Author

N65-29065# Princeton Univ., N. J. Plasma Physics Lab.
A NEGATIVE V SYSTEM BY USE OF A HELICAL TUBE
Tsuneo Amano (Kyoto Univ., Japan) Jul. 1965 7 p refs
(Contract AT(30-1)-1238)
(MATT-340)

A system is considered for stable confinement of plasma in a helical system, where the contour integral $d\,l/B$ has a local maximum. Equations are solved for a helical tube whose axis is a helix of radius a and pitch $2\pi/h$ twisted around an axis (e.g., the z-axis of a Cartesian coordinate system (x,y,z). When a solenoidal winding is applied on the vacuum vessel of the tube, the magnetic field lines have stabilizing or destabilizing curvatures depending on whether they lie on the inside edge of the tube (the side of the z-axis) or the outside edge. Stability can be obtained by using magnetic surfaces in which the lines of force spend a longer time at the inner edge than at the outer edge. Such magnetic surfaces can be obtained by means of $l = 2$ and $l = 3$ helical windings on the vacuum vessel of the tube in addition to the solenoidal winding. Equations are also solved showing how stability can be obtained by using the curvature of a torus instead of a helical tube. L.S.

N65-29086# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DETERMINING THE DEGREE OF HETEROGENEITY OF A DC AND AC ARC DISCHARGE
I. V. Dvornikova and I. M. Nagibina 7 May 1965 18 p refs Transl. into ENGLISH from Opt. i Spektroskopiya (Moscow), v. 4, no. 4, 1958 p 421–429
(FTD-TT-64-1138/1+2; AD-615864)

Arc discharge heterogeneity is determined, based on the theory of radiation of a heterogeneous source, and temperature distribution in neutral atoms along the section of the arc discharge. Cave-in depths of spontaneously turned multiplier lines are utilized. A Febry–Pero standard in combination with spectrographs of greater dispersion is used for measurements. Expressions for the intensity distribution of the observed spectral line are derived in various forms. Results show that the discharge cloud for neutral chromium and manganese atoms differ to a slight degree in heterogeneity; changes in arc burning conditions lead to a certain change in degree of heterogeneity; and the discharge cloud is more uniform for ions than for neutral atoms. C.T.C.

26 PHYSICS, SOLID-STATE

Includes semiconductor theory; and superconductivity. For applications see: 16 Masers. For related information see also: 10 Electronics.

N65-28104# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STANDARD PROPERTIES OF SEIGNETTE ELECTRIC CRYSTALS LOOP OF DIELECTRIC HYSTERESIS
I. S. Zheludev, D. A. Tambovtsev, and B. P. Terent'yev 15 Jan. 1965 14 p refs Transl. into ENGLISH from Elektrichestvo (Moscow), no. 8, 1963 p 66–70
(FTD-TT-64-697/1+2; AD-610368)

The use of the special properties of Seignette electric crystals with rectangular dielectric hysteresis loops as standard or reference voltage sources is discussed. Oscillograms of dielectric hysteresis loops for triglycine sulfate and bismuth titanate crystals are shown. Dynamic characteristics of these crystals are considered and compared with other standard voltage sources. E.E.B.

N65-28110# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON PERSPECTIVES OF EMPLOYING THE MOSSBAUER EFFECT FOR AUTOMATIC CONTROL
N. N. Shumilovskiy, L. V. Mel'ttser, and I. A. Braun 20 Jan. 1965 20 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR., Tekhn. Kibernetika, no. 6, 1963 p 111–120
(FTD-TT-64-784/1+2; AD-610796)

The possibilities of automatically controlling composition by the use of the Mossbauer effect are discussed. This method has the advantage that the result is not affected by elements situated in the same group in the periodic table or by isotopes of the same element. Thus, the method can be used for isotopic concentration measurements. E.E.B.

N65-28167# Brown Engineering Co., Huntsville, Ala. Research Labs.
EXPERIMENTAL STUDY OF COLLECTIVE ELECTRON EXCITATIONS IN THIN SUPERCONDUCTING METAL FILMS Summary Technical Progress Report
Harry J. Watson Jan. 1965 33 p refs
(Contract Nonr-4549(00))

The electron accelerator and energy analyzer have been constructed and tested. The energy losses for several metals including aluminum, tin and lead have been observed and the results compare favorably with the free electron plasmon theory. Preliminary reduced temperature measurements have been made on aluminum using liquid nitrogen and a change in the energy loss values is observed. Author

N65-28171# Sperry Microwave Electronics Co., Clearwater, Fla.
ADVANCED FERRIMAGNETIC MATERIALS APPLIED TO DIGITAL PHASE SHIFTERS First Semiannual Report, 25 Jun.–25 Dec. 1964
Jan. 1965 77 p refs
(Contract AF 30(602)-3490; ARPA Order-550; Proj. Defender)
(SJ.M-220-0052-3; AD-610632)

The operating characteristics of microwave ferrite digital phase shifters and the dependence of these characteristics on material parameters are discussed. The experimental investigations on materials to date have concentrated on the hybrid garnet compositions. Compositions comprised of individual and composite substitutions of the following metal ions in yttrium iron garnets have been prepared and evaluated: gadolinium, holmium, dysprosium, erbium, terbium, samarium, ytterbium, aluminum, and gallium. The structural, microwave, and magnetic characteristics of these compositions have been tabulated. The influence of the preparation procedure parameters on the properties of the materials are described. Conclusions are offered in regard to the material characteristics tabulated with additional interpretation on structural effects. Rf evaluation of some of the materials has been performed in X-band waveguide. The results of these investigations are discussed. Author

N65-28189# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SENSITIVITY OF SILICON PHOTOCELLS TO GAMMA-RAYS
A. Shalpykov and Ye. M. Lobanov 16 Apr. 1965 13 p refs
Transl. into ENGLISH from Tr. Tashkentskoi Konf. po Mirnomu Ispol'zovaniyu Atomnoy Energii (Tashkent), v. 1, 1961 p 271–276
(FTD-TT-64-1165/1+2; AD-615225)

Different photoelectric characteristics of silicon photocells were obtained for the purpose of comparing the action of the different kinds of penetrating radiation on silicon photocells. TAB

N65-28220# Oak Ridge National Lab., Tenn.
SOLID STATE DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING MAY 31, 1965
D. S. Billington, J. H. Crawford, Jr., and M. K. Wilkinson Jul. 1965 106 p refs
(Contract W-7405-ENG-26)
(ORNL-3841) CFSTI: $4.00

The techniques for preparing solids in as defect-free a state as possible were investigated. Areas that were covered are: (1) Crystal Physics—Data are provided on physical processes in crystal lattices by a variety of experimental investigations. Research was centered around the two main themes of neutron scattering and lattice defects. (2) Nonmetals—The main concern of this work is imperfections: the creation of defects and other imperfections in the crystal such as dislocations and impurity atoms, and the thermal recovery of these defects. (3) Metals—This section is concerned with defects in metal crystals, the production of the defects by irradiation, the characteristics of point defects, clusters of defects and dislocations, and the effect of these defects on the physical and chemical properties of metals. (4) Radiations Metallurgy—Activities fall into two interrelated categories: radiation hardening and embrittlement, and the effect of radiation on diffusion-controlled processes in alloys. Abstracts on related subjects are also presented. R.W.H.

N65-28221# Atomics International, Canoga Park, Calif.
RADIATION DAMAGE IN SILICON: NEUTRON SPECTRUM CONSIDERATIONS
M. N. Robinson 10 Jun. 1965 20 p refs
(Contract AT(11-1)-GEN-8)
(NAA-SR-10612) CFSTI: $1.00

A spectrum normalization scheme for radiation change in silicon is proposed and applied to some representative test spectra. It is shown that significant differences may be predicted for data obtained in different environments. This technique should be effective in resolving such apparent contradictions in the data; and it should also permit a more accurate prediction than heretofore of the response of silicon semiconductors to new radiation environments. Author

N65-28228# National Engineering Science Co., Pasadena, Calif.
STUDY AND INVESTIGATION OF THE ANOMALOUS DISPERSION PHENOMENON IN CERTAIN MATERIALS TO DETERMINE ITS FEASIBILITY FOR USE IN A LASER SCANNER Final Report, 12 Nov. 1963–27 Aug. 1964
J. Basinski, Gerald Cline, N. George, Henry Hodara, C. Viswanathan et al Griffiss AFB, N. Y., RADC, Mar. 1965 143 p refs
(Contract AF 30(602)-3248)
(SN-169; RADC-TDR-64-467; AD-614802)

Anomalous Dispersion phenomena have been investigated as to their applicability to rapid deflection of laser beams. The deflection technique consists of varying the refractive index of a suitable material through a wavelength shift of its dispersion curve. Research on the feasibility of the technique has been carried out for the 6328 Å CW gas lasers with the following target objectives: 30 K cps deflection rates, 1000 resolution elements, 10° deflection angle and less than 10% absorption loss. The results of the investigation show that beam deflection techniques by anomalous dispersion techniques are not practical at present because materials cannot be found that satisfy the conflicting requirements of high ionic density and oscillator strength and narrow linewidth. Author

N65-28234# Massachusetts Inst. of Tech., Cambridge. Lab. for Insulation Research.
MAGNETIC ANNEAL EFFECTS IN SOME GARNETS
Robert P. Hunt Apr. 1965 47 p refs
(Contract Nonr-1841(10); AF 19(604)-5482)
(TR-199; AD-615370)

Many properties of polycrystalline and reduced single crystal yttrium-iron-garnet have been attributed to the presence of ions which provide mobile electrons that can diffuse locally through the lattice. This electron-diffusion process was studied by means of several low-temperature torque experiments on

silicon doped YIG. Silicon-doped YIG shows an induced anisotropy proportional to the doping when magnetically annealed at low-temperatures. The kinetics and temperature dependence of this anisotropy were investigated. The garnet also demonstrates a constant high field component of rotational hysteresis which is both temperature and frequency dependent. The intrinsic, unannealed anisotropy at room temperature coincides with that of normal YIG, but between 150° and 300° K increases above that of pure YIG. Below about 150K the curves develop asymmetry and are no longer cubic. Author

N65-28279# Joint Publications Research Service, Washington, D. C.
STUDY OF MAGNETIC PROPERTIES OF FILMS
1 Jul. 1965 24 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Fiz. (Moscow), v. 29, no. 4, 1965 p 604–609, 610–614
(JPRS-30904; TT-65-31403) CFSTI: $1.00

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2. MULTILAYER THIN FERROMAGNETIC FILMS L. V. Kirenskiy, T. P. Izotova, I. M. Salanskiy, and M. K. Savchenko p 4–13 refs (See N65-28281 17-26)

3. MAGNETIC INTERACTION OF LAYERS IN A TWO LAYER FILM L. V. Kirenskiy, T. P. Izotova, and N. M. Salanskiy p 14–21 refs (See N65-28282 17-26)

N65-28280 Joint Publications Research Service, Washington, D. C.
INVESTIGATION OF THE CONDITIONS FOR TRANSITION FROM NONUNIFORM TO UNIFORM ROTATION FOR THE ALTERNATING MAGNETIZATION OF THIN PERMALLOY FILMS
R. V. Telesnin, O. S. Kolotov, and V. A. Pogozhev *In its* Study of Magnetic Properties of Films 1 Jul. 1965 p 1–3 refs (See N65-28279 17-26) CFSTI: $1.00

The transition from nonuniform to uniform rotation was found to correspond to the transition from nonunilateral to unilateral rotation where the moment of this transition is determined by the condition

$$H_v H_w = C$$

and is attained due to the joint action of the magnetic fields H_v, the variable magnetic field applied along the axis of easy magnetization, and H_w, the magnetic field normal to H_v. C is a constant depending upon the properties of the film. E.E.B.

N65-28281 Joint Publications Research Service, Washington, D. C.
MULTILAYER THIN FERROMAGNETIC FILMS
L. V. Kirenskiy, T. P. Izotova, I. M. Salanskiy, and M. K. Savchenko *In its* Study of Magnetic Properties of Films 1 Jul. 1965 p 4–13 refs (See N65-28279 17-26) CFSTI: $1.00

An investigation of multilayer films indicated the possibility of obtaining such films with magnetostable states. The hysteresis loops were studied for multilayer films deposited from materials having different coercive forces. The multilayer films had a lower value for H_c. The magnitude of H_c for the layers was found to be dependent upon the composition of the molecular cluster and the backing, upon the sequence of the deposition of the magnetic layers, and upon their thickness. The effect of a decrease in H_c for the magnetic layers for a film having a layer thickness of 1200 Å is independent upon the direction of the easy magnetic axes of the layers with respect to each other. E.E.B.

N65-28282 Joint Publications Research Service, Washington, D. C.
MAGNETIC INTERACTION OF LAYERS IN A TWO LAYER FILM
L. W. Kirenskiy, T. P. Izotova, and N. M. Salanskiy *In its* Study of Magnetic Properties of Films 1 Jul. 1965 p 14–21 refs (See N65-28279 17-26) CFSTI: $1.00

Experiments carried out for studying the discontinuities in a two layer and single layer film showed an increase in inhomogeneities in magnetic layers coated with quartz. The mechanical inhomogeneities associated with the penetration of the quartz particles into the magnetic layers probably affects other magnetic properties of the film, but there is almost no affect on the magnitude of H_c. A decrease in H_c is caused by constant formation and growth conditions for the nuclei. The appearance of inverse magnetization nuclei for negative external fields and their distribution over the film surface indicated the existence of inhomogeneous local magnetic fields whose distribution depended upon the thickness of the magnetic layer. E.E.B.

N65-28359# Cornell Univ., Ithaca, N. Y. Lab. of Atomic and Solid State Physics.
EFFECT OF MANY-BODY INTERACTIONS ON THE TEMPERATURE-DEPENDENT AMPLITUDE OF DE HAAS–VAN ALPHEN OSCILLATIONS
J. W. Wilkins and J. W. F. Woo May 1965 9 p refs
(Contract Nonr-401(38))
(TR-6; AD-615594)

Recent improvements in experimental technique have permitted the measurement of the temperature-dependence of the amplitude of de Haas–van Alphen oscillations. According to the conventional independent-particle theory the amplitude has a temperature-dependence proportional to

$$T \exp\left\{-2\pi^2 k_B T(m^* c/eH)\right\} \quad \text{for temperatures } k_B T \sim \hbar\omega_c$$

where m^* is the band structure effective mass corresponding to the cyclotron orbits associated with the dHvA oscillations. It is shown that at low temperatures ($T << \theta_{Debye}$) when many-body effects are included the mass should be enhanced by electron-phonon interactions. E.E.B.

N65-28371# Weizmann Inst. of Science, Rehovoth (Israel). Dept. of Electronics.
DETERMINATION OF THE CRYSTAL STRUCTURE OF YTTRIUM ORTHOFERRITE AND REFINEMENT OF GADOLINIUM ORTHOFERRITE
P. Coppens and M. Eibschütz 1 Dec. 1964 29 p refs
(Contract AF 61(052)-654)
(TN-14; AD-614495)

The crystal structure of yttrium orthoferrite has been determined from full three-dimensional counter data and refined in the space group Pbnm by least squares to an accuracy of about .001 and .01Å in positional parameters of Y^{3+} and O^{2-} respectively. Parameters are compared with those of $FdFeO_3$, derived by least squares refinement of Geller's intensity data. It is found that the distortions from the ideal perovskite lattice hardly affect the octahedral environment of the Fe^{3+} ion, which makes it possible to predict $Fe^{3+}-O^{3-}-Fe^{3+}$ angles in other distorted perovskite structures of

known cell dimensions. Refinement in the alternative non-centric space group $Pbn2_1$, shows small possibly real deviations from a centric structure. Author

N65-28374# General Electric Co., Schenectady, N. Y.
ELECTRICAL CONDUCTANCE IN ORGANIC SOLIDS Quarterly Technical Report, 1 Oct.–31 Dec. 1964
Charles M. Huggins and Oliver H. Le Blanc, Jr. [1965] 6 p
(Contract DA-31-124-ARO(D)-175; ARPA Order 462)
(AD-610655)

This fourth quarterly progress report outlines the progress made on a two year program to study the electrical characteristics of some organic solids. The work is divided along three general lines: a) the study of transport of carriers injected into insulating (or poorly conducting) solids by an electron gun, b) electrical measurements on highly conducting ion-radical salts, and c) study of carrier transport in some amorphous systems. During this quarter, the work has been centered on the first of these objectives. To this end, mobility and lifetime measurements for electrons and holes have been made on a series of singlecrystal anthracene specimens. Good mobility data were obtained at room temperature on these samples, but severe trappings limited the lifetimes to ~50 microseconds. An attempt is being made to obtain crystals of higher purity and less trapping in order to extend the measurements to lower temperatures. Author

N65-28492# France. Ministere de l'Air, Paris.
THE PHYSICAL PROPERTIES OF POLYCRYSTALS CONSIDERED AS THE MEAN VALUES OF THOSE OF MONOCRYSTALS [LES PROPRIETES PHYSIQUES DES POLYCRISTAUX CONSIDEREES COMME DES VALEURS MOYENNES DE CELLES DES MONOCRISTAUX]
F. Gallissot and R. Vergne Ser. de Doc. Sci. et Tech. de l'Armement, 1965 113 p refs In FRENCH *Its* Publ. Sci. et Tech. No. 412

This report examines the mean value of the mechanical constants of a polycrystalline medium as a function of the mechanical constants of a monocrystal, with a supposed random distribution of the axes of the crystal. The mathematical mean yields fourth order tensors, both contravariant (module of elasticity) and covariant (constant of elasticity). Thus two different mean isotropic mediums are obtained. The authors indicate how one unique mean medium can be obtained. The authors also present magnetostriction and the orientation superstructure created by the elastic deformation of the lattice. They then develop a correction leading to a mean value proper to its size. Trans. by J.G.

N65-28500# Laboratory for Electronics, Inc., Boston, Mass. Solid State Electronics Lab.
ELECTRO-OPTICAL MATRIX DISPLAY Interim Development Report, 1 Aug.–31 Oct. 1964
Jan. 1965 24 p refs
(Contract NObsr-91199)
(IDR-480-Q2; AD-610510)

The initial phase of the program directed toward the fabrication of a workable electro-optical display using the magnetic properties of RIS 1 thin films in conjunction with the Bitter powder pattern technique is described and the results of material investigations along these lines presented. The dependence of many of the properties of the magnetic film elements upon the conditions of preparation are detailed. The problems involved in the preparation of improved Bitter colloids have been investigated. Electrical line-at-a-time writing and erasure experiments were performed on display panel models. Author

N65-28525# Airtron, Inc., Morris Plains, N. J.
GROWTH OF BROAD LINEWIDTH RUBY CRYSTALS Final Report, 1 May 1962–30 Apr. 1964
[1964] 80 p refs
(Contract Nonr-3832(00); ARPA Order 306; Proj. Defender)
(R-11-454; AD-615557)

Progress has been achieved in perfecting the techniques for the growth of ruby from flux and broadening the fluorescent linewidth by Ga additions. It has been demonstrated that large flux free ruby crystals suitable for fabrication into laser rods can be produced by spontaneous nucleation from slowly cooled molten salts. By lowering the pedestal supporting an 8 inch × 8 inch crucible until a 200° C gradient is obtained, and slowly cooling a PbF_2 melt at 1.5° C per hour, large ruby plates up to 3/8 inches thick and 2 inches in maximum dimensions have been grown. Attempts to grow larger crystals by growth on ruby seeds were not successful, but it was established that crystals can be grown free from chromium content variation by using ruby nutrient and growing crystals in a temperature gradient under steady state conditions. Solubility of Al_2O_3 in PbF_2 has been measured and the effect of Cr and Ga on the solubility has been determined. Chemical analysis of the crystals shows a concentration gradient exists for Cr but not for Ga. Line broadening was achieved in ruby crystals both by the deliberate addition of Ga, and by the substitution of O^{2-} by F^- during crystal growth. Broadening in excess of 10 cm^{-1} was obtained due to a combination of these factors. Two rods cut from these crystals lased at 2000 and 1200 joules respectively in a 3 inch long laser head at 200° K. Author

N65-28657# Bausch and Lomb, Inc., Rochester, N. Y.
STUDY OF NON-OXIDE MATERIALS WITH DEFECT STRUCTURES Annual Report, Period Ending 31 Dec. 1964
D. A. Buckner and P. C. Velasquez 31 Dec. 1964 31 p
(Contract Nonr-3632(00); ARPA Order 269)
(AD-615609)

During the report period three systems were examined which provided data to illustrate three principal types of defects under consideration. These defects were exemplified by: (1) the system $3NaF \cdot 5YF_3$–CaF_2 (the half-breed defect type); (2) the system CaF_2–YF_3 (the interstitial anion defect type); and (3) the system LaF_3–SrF_2 (the anion vacancy defect type). The existence and nature of the defects were characterized by documentation of several physical measurements such as density, refractive index, and X-ray determined lattice parameters. In addition to the preparation of test-tube amounts of material, large batches were prepared and experiments in hot-pressing significant size specimens of selected composition were conducted. Resulting polycrystalline ingots were used in attempting some measurements of physical properties. N.E.A.

N65-28681# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DISLOCATIONS IN ION CRYSTALS
V. L. Indenbom 20 Apr. 1965 23 p refs Transl. into ENGLISH from Fiz. Shchelochnogaloidnykh Kristallov, Tr. II. Vsesoyuznogo Soveshchaniya, Riga, 19–24 Jun. 1961 G. (USSR), 1962 p 439–452
(FTD-TT-64-1183/1+2; AD-615231)

Topics include: experimental methods of studying dislocations, geometry of dislocations and plastic anisotropy of ion crystals; dislocations and real structure of crystals, internal stresses, plasticity, and destruction. Author

N65-28748# Massachusetts Inst. of Tech., Cambridge. Lab. for Insulation Research.
THE CRYSTAL STRUCTURE OF $Bi_2Ti_4O_{11}$

Gunnar Jensen Apr. 1965 24 p refs
(Contract Nonr-1841(10))
(TR-198; AD-614797)

The unit cell of the compound $Bi_2Ti_4O_{11}$ is face-centered monoclinic and contains 4 formula units. Its space group is C_{2h}^3 with all atoms in general positions, except for oxygen atoms lying on twofold axes. A phase transition is observed at 250°C, and the structure of the high-temperature modification is discussed. The unit cell of a related structure, probably stabilized by impurities, is also reported. Author

N65-28828# Lockheed Missiles and Space Co., Sunnyvale, Calif.
PECULIARITIES OF THE DEFORMATION OF SOLIDS UNDER THE COMBINED EFFECT OF DIFFUSION AND HEAT CONDUCTION
L. A. Svergunenko [1964] 5 p refs Transl. into ENGLISH from Dopovidi Akad. Nauk Ukr.RSR(Kiev), no. 4, 1965 p 460–463

In investigations of the internal friction in solids cases have been examined when diffusion and heat conduction were considered as independent mechanisms of elastic energy dissipation and the effect of each was taken into account separately. Such an examination does not solve the question of the role of cross-mechanisms of relaxation such as thermal diffusion. A solution of the problem of the joint effect of diffusion and heat conduction on internal friction, taking account of the interaction of both processes is presented. E.E.B.

N65-28863# Michigan Technological Univ., Houghton. Dept. of Metallurgy.
DEFECT BEHAVIOR IN PLASTICALLY DEFORMED SEMICONDUCTORS Final Report
L. A. Heldt 17 Mar. 1965 6 p refs
(Grant AF-AFOSR-62-290)
(AFOSR-65-0663; AD-614842)

This research is concerned with the behavior of defects during plastic deformation and the relation of this behavior to observed plastic properties. The experimental program is concerned with the semiconductor elements, for which rather direct means of investigation are applicable. The study involves carefully controlled determinations of the plastic properties of material deformed under constant stress. The effects of: (1) heavy doping (2) specimen orientation and type of deformation and (3) an impurity precipitated along the dislocation lines, are measured in order to determine the relation of dislocation motion to the production of point defects, the effect of the density of dislocation intersections on dislocation motion, and the effects of an impurity precipitated along dislocation lines upon dislocation motion. Author

N65-28896# Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
[HIGH PRESSURE STUDIES] Progress Report, Period Ending 30 Nov. 1964
Nov. 1964 22 p refs
(Contract Nonr-1866(10))
(PR-33; AD-615593)

Research progress is reported in the following fields: (1) optical and electrical properties of the lead salts under pressure; (2) electrical properties of gray tin as a function of pressure; (3) effect of pressure on reflectivity spectra; (4) spin resonance measurements on semiconductors; (5) properties of transition metal oxides; (6) construction and application of ratio-type spectrometer for measuring small increments in absorption coefficients; (7) semiconducting properties of forsterite; (8) Faraday rotation in semiconductors; (9) optical properties of semiconductor thin films, including cadmium and mercury telluride and their alloys, germanium, and lead sulfide; (10) band structure of gallium antimonide; and (11) infrared shift of the emission of lead salt diodes with pressure. A review of significant technical accomplishments during 1964 is included. M.W.R.

N65-29058# Atomic Energy Commission, Oak Ridge, Tenn. Div. of Technical Information Extension.
BISMUTH, LEAD, AND TIN TELLURIDES A Literature Search
Sidney F. Lanier, comp. Jun. 1965 53 p refs
(TID-3583) CFSTI: $3.00

N65-29120# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CHANGE IN ELECTROCONDUCTION OF VITREOUS SEMICONDUCTORS ($TlAsSe_2$; $TlAsSe_4$; $As_4Se_3Te_3$ AND As_2Se_2Te) IN DEPENDENCE UPON THE MAGNITUDE OF INTEGRAL DOSAGE OF GAMMA-RADIATION
A. N. Bobrova and Ye. M. Lobanov 13 Apr. 1965 8 p refs Transl. into ENGLISH from Radiats. Effekty v Tverdykh Telakh (USSR), 1963 p 45–49
(FTD-TT-64-1166/1+2; AD-614956)

The dependence of electrical conductance on the integral dosage of gamma radiation is reported for the following vitreous semiconductors: $TlSe.As_2Se_3$, $As_2Se_3.As_2Te_3$, and $2As_2Se_3.As_2Se_3$. TAB

27 PROPELLANTS

Includes fuels; igniters; and oxidizers. For basic research see: 06 Chemistry; and 33 Thermodynamics and Combustion. For related information see also: 28 Propulsion Systems.

N65-28446*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALYSIS OF FLUORINE ADDITION TO THE VANGUARD FIRST STAGE
William A. Tomazic, Harold W. Schmidt, and Adelbert O. Tischler Washington, NACA, 24 Jan. 1957 29 p refs
(NACA-RM-E56K28) CFSTI: HC $2.00/MC $0.50 CSCL 21I (Declassified)

The effect of adding fluorine to the Vanguard first-stage oxidant was analyzed. An increase in specific impulse of 5.74 percent may be obtained with 30 percent fluorine. This increase, coupled with increased mass ratio due to greater oxidant density, gave up to 24.6-percent increase in first-stage burnout energy with 30 percent fluorine added. However, a change in tank configuration is required to accommodate the higher oxidant-fuel ratio necessary for peak specific impulse with fluorine addition. Increased performance of this order can be obtained without tank-configuration change by addition of unsymmetrical dimethyl hydrazine (UDMH) to the fuel coincident with fluorine addition to the oxidant. With 30 percent fluorine and approximately 51 percent UDMH, the burnout energy can be increased 23.5 percent. Fluorine addition will increase the engine heat-rejection rate about 1 percent for each 1 percent fluorine added up to 30 percent. Author

N65-28457*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF A COMPOSITE SOLID PROPELLANT AT SIMULATED HIGH ALTITUDES
Carl C. Ciepluch Washington, NASA, Dec. 1959 15 p refs (Declassified)
(NASA-TM-X-95) CFSTI: HC $1.00/MF $0.50 CSCL 21I

An investigation was conducted in an altitude test chamber to determine the performance of a typical composite solid propellant at high nozzle pressure ratios and for a range of chamber pressure. Specific-impulse measurements were made over a range of pressure ratio from 115 to 1200 for fully expanded flow. The characteristic exhaust velocity and specific impulse were determined for a range of chamber pressure from 180 to 920 pounds per square inch absolute. Experimental measurements of propellant specific impulse and characteristic exhaust velocity were compared with theoretically calculated values for both frozen and equilibrium expansions.
Author

N65-28598# Mathematical Sciences Corp., Seattle, Wash.
PARAMETRIC STUDY OF ROCKET GRAIN CONFIGURATIONS BY PHOTOELASTIC ANALYSIS Quarterly Progress Report No. 1, 4 Jan.–30 Apr. 1965
R. R. Parmerter and M. E. Fourney 1 May 1965 38 p refs
(Contract AF 04(611)-10529)
(MSC-65-29-3; AD-464943)

A series of photoelastic tests were conducted to establish the effect of slot width on a family of solid propellant rocket grains. The geometry of a typical cross section for the series is shown and is defined by the four parameters: the number of star points; the port fraction; the slot width factor; and the fillet radius factor. Limit points were determined by a parametric series of tests. The method of analysis is outlined, and the results are presented graphically.
M.R.W.

N65-28740# Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
VISCOELASTIC BEHAVIOR OF A FILLED ELASTOMER IN REVERSED TORSION
B. Albrecht and A. M. Freudenthal May 1965 48 p refs
(Contract Nonr-266(78))
(TR-27; AD-466039)

The mechanical behavior of polyurethane rubber filled with granular potassium chloride was investigated by subjecting tubular specimens to oscillatory torsion. The response of the material was studied to variation of frequency and amplitude of the imposed strain as well as to variation of the temperature. Besides the measurement of the storage and loss moduli, the normal forces are observed and the second order moduli, the cross-elasticity and the cross-viscosity moduli are evaluated.
Author

28 PROPULSION SYSTEMS

Includes air breathing, electric, liquid, solid, and magnetohydrodynamic propulsion. For nuclear propulsion see: 22 Nuclear Engineering. For basic research see: 23 Physics, General; and 33 Thermodynamics and Combustion. For applications see: 31 Space Vehicles. For related information see also: 27 Propellants.

N65-28136*# National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio.
COMBUSTOR PERFORMANCE OF A 16-INCH RAM JET USING GASEOUS HYDROGEN AS FUEL AT MACH NUMBER 3.0
Joseph F. Wasserbauer and Fred A. Wilcox Washington, NACA, 18 Jan. 1957 24 p refs
(NACA-RM-E56K28a) CFSTI: HC $1.00/MF $0.50 CSCL 21A (Declassified)

An investigation was conducted in the NACA Lewis 10- by 10-foot supersonic wind tunnel to evaluate the performance of three burner configurations in a 16-inch ram jet with gaseous hydrogen as fuel. Results of this investigation showed that a flameholding shroud fitted to an injector-burner greatly improved its performance. This flameholding shroud-injector combination gave high combustion efficiencies over a wide fuel-air-ratio range, reaching 93 percent near critical inlet operation, and operated very satisfactorily under inlet pulsing. The results also indicated that combustor tailpipe length, including the converging nozzle, could be shortened from 3 to 2 feet with only a 1-percentage-point drop in combustion efficiency at critical inlet conditions.
Author

N65-28328# Lockheed Missiles and Space Co., Sunnyvale, Calif.
EXPERIMENTS WITH A SOLID-PROPELLANT ACOUSTIC OSCILLATOR: MATERIALS AND CHEMISTRY
J. F. Engler and W. Nachbar Jul. 1963 103 p refs
(Rept.-6-90-63-80; AD-615200)

An end-burning, side-vented, solid-propellant motor designed to produce essentially one-dimensional acoustic oscillations has been under development and test for the past three years. The immediate purpose of these investigations was to study the growth and decay of self-excited, combustion-driven, acoustic oscillations in chamber pressure and to measure the effects of operating parameters upon the growth rates, amplitudes, and frequencies of the oscillations. An ultimate purpose is to use this information as a guide to the further development of a theory of solid-propellant acoustic combustion instability. The report presents certain results from current experiments in which an essential innovation was the use of a transparent quartz tube containing the propellant sample and serving as part of the combustion chamber during burning.
Author

N65-28445*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE APPEARANCE OF A BORIC OXIDE EXHAUST CLOUD FROM A TURBOJET ENGINE OPERATING ON TRIMETHYLBORATE FUEL
Albert M. Lord and Warner B. Kaufman Washington, NACA, 10 Aug. 1956 12 p ref
(NASA-RM-E56G30) CFSTI: HC $1.00/MF $0.50 CSCL 21E (Declassified)

An investigation was conducted on the size and density of the boric oxide exhaust cloud from a J47-25 turbojet engine operating on trimethylborate fuel at sea-level static conditions. Movies and still photographs were taken from the ground and from a helicopter. Objects could not be perceived through the main body of the cloud at distances up to 800 feet from the engine. Data are included on the amount of fallout from the cloud and the concentration of boric oxide in the cloud. A radiation detection device was set up to determine whether the glowing oxide particles would be more susceptible than hydrocarbon exhaust gases to this type of tracking device. The device showed an increase in radiation by a factor of 3 for trimethylborate over that for JP-4.
Author

N65-28458*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PRELIMINARY RESULTS FROM FREE-JET TESTS OF A 48-INCH-DIAMETER RAM-JET COMBUSTOR WITH AN ANNULAR CAN-TYPE FLAME HOLDER
Carl B. Wentworth, Wilbur F. Dobson, and Warren D. Rayle Washington, NACA, 11 May 1955 21 p refs
(NACA-RM-E54L07) CFSTI: HC $1.00/MF $0.50 CSCL 21A (Declassified)

A ram-jet engine with an experimental 48-inch-diameter combustor was investigated in an NACA free-jet facility. The combustor was designed to reach an optimum combustion efficiency at a fuel-air ratio between 0.035 and 0.040. The flame-holder design comprised an annular can or basket with the inner surface terminating in an annular V-gutter flame holder. About 40 percent of the engine air was bypassed around the flame-holder region so that the combustion occurred in nearly stoichiometric mixtures. This stratification served not only to increase the combustion efficiency but also to reduce the sensitivity of the combustor to changes in fuel-air ratio. The bypass shroud terminated at the downstream edge of the outer surface of the flame holder. Three combustor lengths and three fuel-distribution systems were investigated over a range of fuel-air ratios from 0.025 to 0.060 at air flows of 40 and 60 pounds per second (combustor-outlet total pressure from 550 to 1025 psfa). Author

N65-28460*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AFTERBURNER PERFORMANCE WITH COMBUSTION-CHAMBER LENGTHS FROM 10 TO 62 INCHES AT SEVERAL AFTERBURNER-INLET TEMPERATURES
Carl C. Ciepluch, Wallace W. Velie, and Richard R. Burley Washington, NACA, 1 Feb. 1956 18 p refs (Declassified)
(NACA-RM-E55K09) CFSTI: HC $1.00/MF $0.50 CSCL 21E

A sea-level static investigation was conducted to determine the effect of variation of afterburner combustion-chamber length and inlet temperature on a low-pressure-loss sea-level afterburner. A 70-percentage-point reduction in combustion efficiency resulted when the combustion-chamber length was reduced from 62 to 10 inches. However, a thrust augmentation ratio of 1.20 was obtained with the shortest (10-inch) combustion chamber at a fuel-air ratio of 0.065. A 36-inch combustion chamber was found adequate with respect to combustion efficiency and thrust augmentation. For combustion-chamber lengths up to 36 inches, the afterburner performance increased rapidly, while above this length only small gains in combustion efficiency and thrust augmentation were available. Reducing the afterburner-inlet temperature from 1700° to 1550° R resulted in a reduction in combustion efficiency of 11 1/2 and 6 1/2 percentage points for 38- and 10-inch combustion chambers, respectively. Author

N65-28875*# Space Technology Labs., Inc., Redondo Beach, Calif.
MICROMETEORITE BOMBARDMENT INITIATING DISCHARGES AND BREAKDOWN IN ION THRUSTORS
J. C. Slattery 24 May 1965 46 p refs
(Contract NAS3-5755)
(NASA-CR-54373; STL-4163-6012-SU-000) CFSTI: HC $2.00/MF $0.50 CSCL 21C

The characteristics of arcing induced by the impact of a micron-sized hypervelocity particle in a simulated ion engine was examined. The work pertains to the threat of damage to spacecraft from micrometeorites in outer space. For several ion engine voltages, the probability of discharge formation was measured in clean systems and in the presence of cesium. Damage caused by an arc was examined photographically for tungsten, copper and aluminum electrodes and the effectiveness of a proposed electrical filter was assessed. The free charge produced by a hypervelocity impact was measured for carbon particles and the ion species tentatively identified. Author

N65-28928# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Institut für Steuer und Regeltechnik.
INFRARED-RADIATION CHARACTERISTIC OF JET FIAT G 91 (R3) [INFRAROT-STRAHLUNGSRICHTCHARAKTERISTIK DES DUSENFLUGZEUGS FIAT G 91 (R3)]
F. Katheder and G. Miosga Feb. 1965 37 p refs In GERMAN; ENGLISH summary
(DVL-381; DLR-FB-65-11) Available from Zentralstelle für Luftfahrtdokumentation und Inform. (ZLDI), Munich: 11 DM

The paper describes the measurement of the IR-radiation energy of the jet G 91 (R3) during its flight with a Barnes R-4K1 Space-Filtering-Radiometer in the spectral region 1.6μ to 2.6μ. The measuring equipment, data-recording and data-reduction are described. The measurements only have been taken at night due to the high radiation level from background during day time. The result, the IR-Radiation-Characteristic, shows that the emitted IR-Radiation depends very much from the aspect angle to the plane (angle between the plane-axis and the line of sight). Author

N65-28954*# Vickers, Inc., Detroit, Mich.
DEVELOPMENT OF A HYDROGEN–OXYGEN INTERNAL COMBUSTION ENGINE SPACE POWER SYSTEM
N. E. Morgan and W. D. Morath Washington, NASA, Jul. 1965 204 p refs
(Contract NAS3-2787)
(NASA-CR-255) CFSTI: HC $8.00/MF $1.25 CSCL 21G

The prototype engine development effort consisting of design studies, hardware modifications, performance and endurance test evaluation, and the fabrication and procurement of new test equipment and instrumentation is discussed. Major design effort was concentrated on the oxygen injector, the hydrogen valve, the piston and cylinder, and the combustion chamber. Engine performance development resulted in a marked reduction in specific propellant consumption compared with past experience. Approximately 12% of the overall program effort was devoted to development of the prototype compressor. Extensive design changes were made on the drive system and the piston seals of the prototype compressor previously fabricated. Also, the test setup and instrumentation were greatly improved as the level of the compressor performance was improved. The study indicates that a prototype engine can be developed that will operate continuously for its design life of 500 hr without adjustment or degradation of performance and that by further reduction of heat losses and friction losses and improvements in combustion, a lower specific propellant consumption can be achieved. E.E.B.

N65-28960*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A PROPULSION ORIENTED STUDY OF MISSION MODES FOR MANNED MARS LANDING
G. R. Woodcock 29 Jun. 1965 39 p refs
(NASA-TM-X-53265) CFSTI: HC $2.00/MF $0.50 CSCL 21F

Results are given of a systems analysis of manned Mars landing missions for a variety of mission modes, including chemical, nuclear, and electric propulsion, and aerodynamic braking. Consistent ground rules and assumptions were used.

The baseline mission requires 450 days for execution and places 4 men on the surface of Mars for 20 days. Advanced missions are discussed. Each mission was analyzed assuming first Saturn V, and then a large reusable Post-Saturn vehicle to be available, in order to provide a comparison. A cost advantage was found for the reusable Post-Saturn for all but very minimal planetary programs. Of the available technologies, the graphite nuclear rocket was found generally preferable to other systems for mission propulsion. Advanced nuclear propulsion, such as ORION, was found to have great potential for advanced missions. Author

N65-29014# Florida Univ., Gainesville. College of Engineering.
SOLAR ENGINES. PART I: A 1/4 HORSEPOWER CLOSED CYCLE SOLAR HOT-AIR ENGINE. PART II: A 1/3 HORSEPOWER CLOSED CYCLE SOLAR HOT-AIR ENGINE
Erich A. Farber and Ford L. Prescott Jul. 1965 13 p refs *Its* Vol. 19, No. 7
(TPR-14)

The operating principle, design, and performance of closed cycle solar hot-air engines are discussed. The 1/4 horsepower engine has certain advantages in the right environment and can be mass produced as economically as other engines of similar size. These engines are safer, more versatile, more rugged, and have fewer parts. The 1/3-hp solar engine shows promise when principally operated by solar energy, possibly supplemented by other fuels. These engines are of the portable or semiportable type and can, if mass-produced, compete in price with other small, low-cost engines. They are versatile, rugged, safe, quiet, and have no waste products when used with solar energy. They also have relatively few parts, reducing maintenance requirements, and make maintenance by unskilled personnel possible. E.E.B.

N65-29020# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Porz (West Germany).
CALCULATION OF SIMILAR OPERATING CONDITIONS OF JET ENGINES [BERECHNUNG AHNLICHER BETRIEBSZUSTANDE VON STRAHLTRIEBWERKEN]
G. Fellner Mar. 1965 84 p refs In GERMAN; ENGLISH summary
(DLR-FB-65-16; DVL-369) Available from Zentralstelle für Luftfahrtdokumentation und Inform. (ZLDI), Munich: 20.20 DM

A relation including the operational behavior of the entire jet engine and its components is given, permitting—contrary to the previously used step-by-step calculations—a uniform and clear representation of relations and the formulation of all engine coefficients (thrust, consumption, etc) in complete form. Engines with adjustable nozzle as well as engines with non-adjustable nozzle are included. The investigation is dealing with turbojet engines and may be transferred to bypass engines. The method presented here is essentially valid in the case of by-pass engines, too, where both gas streams enter a mixing chamber before expanding in a common thrust nozzle. Author

N65-29041# Pennsylvania State Univ., University Park. Radio Astronomy Observatory.
SOLAR RADIO FLUX DURING THE IQSY AT UNIVERSITY PARK, PENNSYLVANIA, JANUARY–FEBRUARY–MARCH, 1965
John P. Hagen 4 May 1965 24 p
(Grant NSF GP-2986)
(SR-243(D))

This report contains solar radio flux data recorded at 10,700 Mc/s and 2,690 Mc/s, during the quarter 1 January 1965 to 31 March 1965. A table of distinct events is also given. Author

N65-29124# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
GREAT-PRESSURE-DROP GAS EJECTOR WITH ADDITIONAL NOZZLE
Yu. N. Vasil'yev 14 Apr. 1965 5 p Transl. into ENGLISH from Soviet Patent No. 134804 (Appl. No. 664925/25, 28 Apr. 1960) 2 p
(FTD-TT-1198/1+2; AD-614961)

A gas injector having great drops or jumps in pressure with a supplementary nozzle of low pressure gas and a narrowing or insufficiently expanded supersonic nozzle of high pressure gas is described. The injector can be used for pumping gas from a single vessel or simultaneously from two vessels with different pressures to obtain a high vacuum. The cut of the supplementary narrowing nozzle of low pressure gas is located in the sudden expansion zone of the high pressure gas flow, where, as a result of the two-dimensional character of the flow, the static pressure is considerably lowered. The supplementary nozzle has axial shifting for placing the ejector into the most favorable position but it is only positioned after accomplishing the supersonic flow of the high pressure gas jet at the initial part of the mixing chamber. R.N.A.

N65-29126# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHOD OF CONTROLLING HOUSINGS OF ENGINE COMBUSTION CHAMBERS WITH THE AID OF AN ULTRASONIC SEEKING HEAD
B. I. Vybornov 15 Dec. 1964 3 p Transl. into ENGLISH from Soviet Patent No. 157845 (Appl. No. 760326/26-10, 16 Jan. 1962) 1 p
(FTD-TT-64-538/1; AD-610414)

A method is described for controlling engine combustion chamber housings with the aid of an ultrasonic seeking head placed obliquely to the outer surface of the housings. Longitudinal and transverse waves are excited in the housings and by alternately changing the angle of inclination of the ultrasonic seeking head in the plane of the investigated direction, inner and outer defects in the housing are detected. R.N.A.

29 SPACE RADIATION

Includes cosmic radiation; solar flares; solar radiation; and Van Allen radiation belts. For related information see also: 13 Geophysics; and 24 Physics, Atomic, Molecular, and Nuclear.

N65-28044*# Space Technology Labs., Inc., Redondo Beach, Calif. Quantum Physics Lab.
THEORETICAL STUDY OF THE COUPLING BETWEEN THE SOLAR WIND AND THE EXOSPHERE Final Report, 14 Jun. 1963–14 Jun. 1964
F. L. Scarf 14 Jun. 1964 36 p refs *Its* Rept.-4
(Contract NASw-698)
(NASA-CR-63716; STL-8494-6004-RU-000) CFSTI: HC $2.00/MF $0.50

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N65-28045* Space Technology Labs., Inc., Redondo Beach, Calif. Quantum Physics Lab.

ON THE ROLE OF ION ACOUSTIC WAVES IN THE TRANSITION REGION

F. L. Scarf *In its* Theoret. Study of the Coupling between the Solar Wind and the Exosphere 14 Jun. 1964 3 p refs Presented at the Solar Wind Conf., Pasadena, Calif., 1–4 Apr. 1964 (See N65-28044 17-29) CFSTI: HC $2.00/MF $0.50

A suggestion is made that the instability of an ion acoustic wave is relevant in explaining the broadening and variability of the transition region, the appearance of upstream precursors and superthermal electron peaks, and the occasional disappearance of a distinct outer boundary. The ion wave frequencies overlap the local electron gyrofrequency, and the wave–particle interaction can distort the electron velocity distribution at low energies (0.5–3 keV), producing a small non-Maxwellian tail. This distortion produces high energy peaks, particularly in regions where the local magnetic disorder is small, and tends to raise γ and broaden the ion wave source region by the fast diffusion process. The incident wind becomes less supersonic and small fluctuations allow isolated precursors to travel upstream and dump ion wave energy in isolated electron spikes. When the distortion of the velocity distribution is high enough, the incident wind becomes subsonic with respect to ion acoustic waves and the entire sheath relaxes, until the next solar wind enhancement initiates a new transient. L.S.

N65-28046* Space Technology Labs., Inc., Redondo Beach, Calif.

ELECTRON ACCELERATION AND PLASMA INSTABILITIES IN THE TRANSITION REGION

F. L. Scarf, W. Bernstein, and R. W. Fredricks *In its* Theoret. Study of the Coupling between the Solar Wind and the Exosphere 14 Jun. 1964 26 p refs (See N65-28044 17-29) CFSTI: HC $2.00/MF $0.50

The theory for broad disordered transition between the solar wind and the magnetosphere is extended by starting from a stage in the development of a hypothetical collisionless shock, rather than from a Chapman–Ferraro magnetopause sheath. It is suggested that before an idealized hydromagnetic shock can be set up, the instabilities become important. Configurations of various possibilities of wind–magnetosphere interactions and breakup are shown. Data transmitted from satellites are considered with respect to the theory. Indications are that on any given pass, the location of a magnetopause (shock front) appears to depend greatly on the type of detector used to measure it, as well as on the range and sensitivity of the instrument. L.S.

N65-28377 Laboratoire de Chimie-Physique, Orsay (France).

STUDY OF PARTICLE TRACKS INDUCED BY INTERACTION WITH COSMIC RADIATION IN MINERALS [ETUDE DES TRACES DE PARTICULES INDUITES PAR LES INTERACTIONS DU RAYONNEMENT COSMIQUE DANS LES MINERAUX]

M. Maurette, R. M. Walker, and P. Pellas (Museum d'Hist. Nat., Paris) *In* CERN Vth Intern. Conf. on Nucl. Phot., Vol. II Jan. 1965 3 p In FRENCH (See N65-28375 17-24)

The possibility that microscopically observable particle traces in terrestrial and extra-terrestrial minerals may have been caused by cosmic radiation was studied. In an experimental study involving tektite, and protons accelerated to 3 GeV, it was found that only the fission processes contributed significantly to the formation of traces. In mica, traces of recoil nuclei heavier than fission fragments were found, but it appears practically impossible in terrestrial mineral samples to find these phenomena induced by cosmic radiation. A terrestrial sample of olivine, subjected to 3 GeV protons in simulation of 100 000 years of exposure in primary flux, did not show any trace indications; however, fossil traces were found in meteoric olivine samples. Trans. by J.M.D.

N65-28541*# Pennsylvania State Univ., University Park. Dept. of Electrical Engineering.

SOLAR IONIZATION FLUX AS DETERMINED FROM SUNRISE MEASUREMENTS OF ELECTRON CONTENT

A. A. Gran 30 May 1965 66 p refs
(Grant NsG-114-61)
(NASA-CR-63835; SR-240) CFSTI: HC $3.00/MF $1.00 CSCL 20H

A means of determining solar ionizing flux from sunrise measurements of the increase of electron content is discussed. It is found that errors well in excess of 20% in electron production rates result from neglect of atomic oxygen ion losses. With this correction, the effective ionizing fluxes were with one exception, about 2×10^{14} ph m^{-2} sec^{-1}. These effective ionizing fluxes represent one half to one third of the total fluxes obtained by photometric methods in the 1027-10A range. Results of a model study of production are used to convert the effective ionizing fluxes into total fluxes. Comparison of these total fluxes with those obtained by photometric measurements suggest that on the average three photons are required to produce two free electrons, and that N_2^+ and possibly O_2^+ are in general lost by rapid recombination during the sunrise period. Author

N65-28596# Pennsylvania State Univ., University Park. Dept. of Electrical Engineering.

SOLAR RADIO FLUX DURING THE IQSY AT UNIVERSITY PARK, PENNSYLVANIA, OCTOBER–NOVEMBER–DECEMBER, 1964

J. P. Hagen 12 Apr. 1965 27 p
(Grant NSF GP-2986)
(SR-241D)

This report contains solar radio flux density data for October, November, and December, 1964. The October, November and December data were taken at 9300 Mc/s, 960 Mc/s and 3035 Mc/s. A description of the receivers used at 9300 Mc/s, 3035 Mc/s and 960 Mc/s is given. During this quarter the only activity detected was a simple burst on December 31, 1965. Author

N65-28597# Pennsylvania State Univ., University Park. Dept. of Electrical Engineering. Dept. of Electrical Engineering.

DETERMINATION OF D-REGION COLLISION FREQUENCY PROFILES FROM PHASE AND AMPLITUDE WAVE INTERACTION MEASUREMENTS

Eugene L. Day [1965] 83 p refs
(Grant NSF GP-846)
(SR-238)

In this research a technique is developed for determining D-region electron collision frequency profiles from simultaneous measurements of phase and amplitude wave interaction. An iterative least squared error procedure is used to find the best exponential collision frequency profile for the interaction measurements. The technique does not require a knowledge of the electron density, the electron temperature, or the disturbing power and accounts for the effects of the underlying ionization. Although the technique is developed for the case of a delta disturbing pulse, it is applicable to actual data since a method is described for transforming data obtained by using a finite disturbing pulse to data corresponding to a delta disturbing pulse. The approach employed is rather versatile and was extended to include determination of the time constant for cooling, $(G\nu)^{-1}$ and the electron density distribution. Author

N65-28781# Library of Congress, Washington, D.C. Aerospace Technology Div.
COHERENT RADIO-EMISSION FROM COSMIC RAY SHOWERS IN THE AIR AND IN DENSE MEDIA [RADIOIZLUCHENIYE OT KOSMICHESKIKH LIVNEY V VOZDUKHE I V PLOTNYKH SREDAKH]
G. A. Askar'yan 6 Jul. 1965 6 p refs Transl. into ENGLISH from Zh. Eksperim. Teor. Fiz. (Moscow), v. 48, no. 3, 1965 p 988–990
(ATD-T-65-42; AD-466150)

The conditions of radio-emission coherence of an excess shower charge in a medium is examined mathematically. The charge at the maximum of shower development is distributed in proportion to the density of the particles of the shower, and the dependency of the interference factor on frequency can be calculated. The calculations offer possibilities of registering cosmic ray showers in the air and in dense media on the basis of radio-emission bursts. L.S.

N65-28974# Boeing Co., Seattle, Wash. Geo-Astrophysics Lab.
NEUTRON FLUX MEASUREMENTS DURING JANUARY AND FEBRUARY 1964
Joleroy Gauger Mar. 1965 103 p refs
(DI-82-0417)

Data relating to the secondary cosmic ray rates measured at aircraft altitudes over an extended geophysical area are presented in detail. Data gathered on two flights (20 January 1964 and 12 February 1964) yielded determinations of the position of the cosmic ray equator along the 40° W and 69° W longitude lines at 1/2° ±1° N and 10° ±2° S respectively. The experimental values compare favorably with the predictions of Shea and Smart. On 27 and 29 January 1964 extended range flights to 73° S latitude provided data pertinent to an evaluation of the position of the south latitude polar plateau. An anomalous neutron flux increase on 21 January 1964 accompanied by an increase in night air glow intensity (5577 Å) is related. The summed data over northern and southern hemispheres allow a comparison of several rigidity models. From the comparison it is apparent that the Makino treatment defines the latitude effects noted better than do the models of Quenby–Webber, Quenby–Wenk, or a rigidity model based on the McIlwain L parameter. Author

N65-29002# Smithsonian Astrophysical Observatory, Cambridge, Mass.
TRANSFER OF RADIATION IN STOCHASTIC MEDIA
George B. Rybicki 4 Jun. 1965 188 p refs
(Grant NSF GP-2226)
(SP-180)

Radiative transfer equations are derived for a medium with small stochastically defined opacity and energy fluctuations. These equations provide relations between the correlation functions connecting these fluctuations and the induced fluctuations in the radiation field. The theory is shown to provide a description of the solar atmosphere, which has statistically defined inhomogeneities due to an underlying convection zone. An unexpected result is that long-range correlations in the emergent intensity may appear which are not directly related to the correlation scales in the energy fluctuations. This suggests the possibility that observations of the long-range correlations in the solar intensity field may yield information about the depth of the underlying convective zone. It is also shown that a generalized limb-darkening law allows the observable intensity autocorrelation function to be used to find the depth dependence of the autocorrelation function of the source function. Further, a method of extending the results to model atmospheres with a depth-dependent opacity is given. E.E.B.

30 SPACE SCIENCES

Includes astronomy and astrophysics; cosmology; lunar and planetary flight and exploration; and theoretical analysis of orbit and trajectory. For related information see also: 11 Facilities, Research and Support; and 31 Space Vehicles.

N65-28000*# Brown Engineering Co., Inc., Huntsville, Ala.
PARAMETRIC STUDY OF LUNAR LANDING TECHNIQUES USING A PREDETERMINED THRUST ORIENTATION
Sam H. Harlin, Jr. Jun. 1965 100 p refs
(Contract NAS8-20073)
(NASA-CR-61075) CFSTI: HC $4.00/MF $0.75 CSCL 22A

A parametric study has been made to show the variation in trajectory parameters, for a predetermined thrust orientation angle to perform lunar descents from an initial parking orbit. Although the analytical methods used in this study are quite common, the presentation of these data in parametric form is unique. To study the actual deviation in the descent parameters the thrust orientation angle is varied. In previous parametric studies most of the data presented have been based on a decelerated stage with a zero angle of thrust orientation. A single propulsive stage was used in this study. Specific impulses and parking orbit altitudes are varied for comparison. Powered braking was considered both before and after passing through pericenter of the Hohmann orbit. The results of the study show the variations of descent parameters for earth thrust-to-weight ratio. These parameters include energy requirements, traversed altitude, initial injection parameters, burning time and range. Author

N65-28185# Chicago Univ., Ill. Dept. of Astronomy.
THEORETICAL INVESTIGATIONS OF THE EXPANSION OF H II REGIONS Final Report, 1 Oct. 1963–31 Dec. 1964
Peter O. Vandervoort 12 Apr. 1965 7 p
(Grant Nonr(G)-00025-64)
(AD-614715)

The results of investigations of certain aspects of the early evolution of H II regions (gaseous nebulae) surrounding newly formed stars of early spectral types are summarized. A portion of the research deals with the properties of the ionization front which forms the boundary of an H II region in case the structure of such a front is non-stationary in the sense that

the interval of time required for the front to overrun an element of the interstellar gas is not negligible compared with the time scale for changes in the structure. The remainder of the research deals with the dependence of the early evolution of an H II region on the finite time scale for the formation of the exciting star. Author

N65-28245# Kitt Peak National Observatory, Tucson, Ariz.
MONTHLY REPORT: KITT PEAK, JANUARY 1965; CERRO TOLOLO, NOVEMBER–DECEMBER 1964, JANUARY 1965
Jan. 1965 31 p Prepared jointly with Cerro Tololo Inter-Am. Obs.

Observation programs for the 84-inch, 36-inch, and 16-inch telescopes at the Kitt Peak National Observatory are presented. A number of optical design and computational problems concerned with 150-inch telescope prime-focus corrector designs and designs for the correctors to be used in testing primary mirrors at the Optical Sciences Center of the University of Arizona, and systems for the correction of foci of the 60-inch reflector being built for the Cerro Tololo Inter-American Observatory are discussed. An Aerobee rocket launch for solar data gathering and its attitude control system are also discussed. Progress on the site development of the Cerro Tololo Inter-American Observatory is reported. R.N.A.

N65-28347*# IIT Research Inst., Chicago, Ill. Astro Sciences Center.
SIGHTING AND TRAJECTORY ANALYSIS FOR PERIODIC COMETS: 1975–1986
F. Narin and B. Rejzer 15 Mar. 1965 91 p refs
(Contract NASr-65(06))
(NASA-CR-63794; T-11) CFSTI: HC $3.00/MF $0.75 CSCL 03A

Possible intercept missions to 55 apparitions of 36 well known short period comets have been analyzed to delineate those of potential interest in long range planning. Detailed perturbation calculations, ballistic trajectory calculations and sighting calculations were performed for each apparition of each comet. A mission to comet D'Arrest in 1976 is, by far, our "best" mission between 1965 and 1986. The D'Arrest mission would launch 4/76 with $\Delta V = 41{,}200$ ft/sec for a four month flight arriving at perihelion when the comet is 7th magnitude. Closing velocity is 13 km/sec. Up to six months tracking are available before launch. A 1970 D'Arrest apparition is available for preliminary observation, and a 1982 apparition for a follow-on flight. A mission to Halley's comet could launch in 1985 with $\Delta V = 43{,}000$ ft/sec for a 7 to 10 month flight arriving, when the comet is 4th or 5th magnitude, with a closing velocity of 70 km/sec. Halley's is the bright, outstanding periodic comet. Author

N65-28362# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ASTROMETRICAL MEASUREMENTS OF MOON PHOTOGRAPHS WITH A PHOTOELECTRIC DEVICE
N. F. Bystrov 26 Apr. 1965 9 p Transl. into ENGLISH from Tr. 15 Astron. Konf. SSSR (Pulkovo), 1960 p 403–406
(FTD-TT-64-1248/1+2; AD-615239)

The scheme of an automatic photoelectric measuring device for measurements of points of the lunar limb is given. A comparison is made of the precision of visual and photoelectric measurements of the lunar limb, to be used for the determination of the coordinates of the moon's center and the study of the irregularities of the limb. Author

N65-28363# Space Technology Labs., Inc., Redondo Beach, Calif.
LUNAR ORBIT SURVEY MISSION
M. P. Francis 8 Dec. 1964 15 p
(Rept.-9883.7-35)

The best orbital plane for a satellite orbiting the moon for the purpose of mapping the lunar surface is discussed. The sun–moon orbital relationships, lunar illumination patterns, and adjustment of the survey satellite orbital planes with respect to the moon are all taken into consideration. A formula is presented for adjusting the surveying satellite plane, and a series of graphs are shown for proper satellite latitude to satisfy the lighting constraints for the east and west orbits for various numbers of plane changes. A diagram giving the arrival geometry of the surveying satellite into orbit around the moon is included. L.S.

N65-28465*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RADAR EXPLORATION OF VENUS: GOLDSTONE OBSERVATORY REPORT Technical Report, Oct.–Dec. 1962
R. Goldstein, R. Stevens, and W. K. Victor, ed. 1 Mar. 1965 188 p refs
(Contract NAS7-100)
(NASA-CR-63806; JPL-TR-32-396) CFSTI: HC $5.00/MF $1.25 CSCL 03B

Venus returned for another conjunction with the Earth in the fall of 1962 and was once again the object of extensive study by the Goldstone radar observatory. Radiometer studies, spectral studies, frequency-time mapping, amplitude-modulated ranging, automatic frequency tracking, and polarization studies were undertaken. The average radar cross-section was found to be 10%, and there was a noticeable variation from day to day. Velocity tracking and time-of-flight measurements definitely confirmed the value of the astronomical unit which was found during the previous conjunction, and refined its accuracy somewhat. Polarization studies show negligible polarization rotation through both the interplanetary medium and the ionosphere of Venus at a wavelength of 12 1/2 cm. Three separate methods were used to determine the rotation period of Venus: tracking of a spectral feature across the disk, estimation of a set of spectral base-bandwidths, and measuring the widths of range-gated spectrums. The estimated period is 250 ±50 days *retrograde*, with the axis of rotation nearly perpendicular to the orbit. Author

N65-28507# Liege Univ. (Belgium). Lab. of Aeronautics and Space Technology.
REGULATION OF CONSTRAINT AND REDUCTION OF PONTRYAGIN'S MAXIMUM PRINCIPLE IN VARIATIONAL CALCULUS [REGULARISATION DES RETICENCES ET REDUCTION DU PRINCIPE DU MAXIMUM DE PONTRJAGIN AU CALCUL DES VARIATIONS]
B. M. Fraeijs de Veubeke May 1964 40 p refs In FRENCH
(OF-3)

The range of applicability of a system dependent on discreet or limited control variables as constraints is represented parametrically with the aid of freely-controlled variables. This process regulates the possible constraints and permits the description of optimal trajectories, which are otherwise unobtainable, as control functions continuous with distance. Pontryagin's maximum principle can then be demonstrated by the Weierstrass method of strong variations. A simple example demonstrates the necessity of regulation for the validation of the principle. Trans. by M.W.R.

N65-28508# Liege Univ. (Belgium). Lab. of Aeronautics and Space Technology.
OPTIMIZATION OF MULTIPLE IMPULSE ORBITAL TRANSFERS BY THE MAXIMUM PRINCIPLE
B. M. Fraeijs de Veubeke and J. Geerts Sep. 1964 35 p refs (OA-4)

The transfer problem in a central gravitational field with minimum propellant expenditure is analyzed by Pontrjagin's maximum principle. Only the energy and angular momentum of the terminal orbits are given and no restrictions are imposed on the transfer duration nor on the transfer polar angle. Under these conditions it is shown that there are no intermediate-thrust arcs. When the available thrust is unbounded and the transfer achieved by means of impulses and coasting arcs a complete analytical solution can be obtained and the coasting arcs are necessarily of the Hohmann type. All the multiple impulse transfers satisfying the maximum principle can be obtained by use of an impulse diagram. However further research is needed to eliminate transfers of a stationary and not minimal character. Author

N65-28509# Liege Univ. (Belgium). Lab. of Aeronautics and Space Technology.
CANONICAL TRANSFORMATIONS AND THE THRUST-COAST-THRUST OPTIMAL TRANSFER PROBLEM
B. Fraeijs de Veubeke Nov. 1964 36 p
(OA-5)

Various formulations of the optimal thrust-coast-thrust transfer problem in a central gravitational field are presented. They are all derived from the basic formulation in polar coordinates by means of canonical transformations. The Lawdon intermediate thrust spirals are shown to imply a restriction on the polar transfer angle. Other types of intermediate thrust spirals would occur for restriction on transfer duration alone or in conjunction with the angular restriction. Rules are given for jumping over the coast phases, that is direct relations between the values of coordinates and adjoint multipliers at the end of a thrust phase and at the start of the next one. Author

N65-28521# Hungarian Academy of Sciences, Budapest.
VZ PEGASI
Katalin Barlai and B. Szeidl 1965 10 p refs *Its* Mitt. der Sternwarte No. 56

Two-color photoelectric observations of the Bailey type "c" RR Lyrae star VZ Pegasi are presented. Observations were conducted using a 24-inch reflector, and measurements were made in blue and yellow through filters. On two consecutive nights the light curve showed a deviation in the depth of the minimum amounting to about 0.05 mag in V and 0.03 mag in B—V. Further observations are required to determine if these variations represent cyclic phenomena or irregular departures from the average. The obtained light and color curves of VZ Pegasi showed the features of an RRc star. A comparison with T Sex and DH Peg is given. R.W.H.

N65-28523# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OPTIMUM TWO-PULSE PASSAGE BETWEEN ORBITS WITH SMALL INCLINATIONS AND ECCENTRICITIES
V. S. Novoselov 15 May 1965 25 p refs Transl. into ENGLISH from Byul. Inst. Teor. Astron. (USSR), v. 9, no. 5, 1963 p 295–309
(FTD-TT-65-64/1; AD-616282)

An analytical formulation of the trajectory of an optimum two pulse rocket flight between orbits with small inclinations and eccentricities is presented. The general solution to the problem of selecting optimum pulsed flights, the conditions of optimum double pulse flight, the case for small mutual inclinations and eccentricities, determining members of the first and second orders, and the applications of the obtained formulas to optimum flights to Venus and Mars are discussed. R.N.A.

N65-28533# Naval Observatory, Washington, D. C.
OBSERVATIONS OF THE SUN, MOON, AND PLANETS: SIX-INCH TRANSIT CIRCLE RESULTS
A. N. Adams and D. K. Scott 27 Nov. 1964 15 p *Its* Circular No. 105

An ephemeris of the sun, moon, and planets observed with six-inch transit circle from March 8, 1963 until July 2, 1964 is tabulated. The observed positions are geocentric and were adjusted for the usual instrumental errors, refraction, diurnal aberration, parallax, and orbital motion. Other pertinent corrections to the observations are included. L.S.

N65-28537*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
THE PRAIRIE METEORITE NETWORK
Richard E. Mc Crosky and Harold Boeschenstein, Jr. 24 May 1965 26 p
(Grant NsG-291-62)
(NASA-CR-63824; SAO Special Rept.-173) CFSTI: HC $2.00/MF $0.50 CSCL 03B

A network of 16 automatic camera stations extending from South Dakota to Oklahoma, and from Illinois to Nebraska for observing bright meteors is described. Meteor impact point, fresh meteorites, trajectory data, and orbital data are discussed. Camera sensitivity, sky coverage, shutter system, sky photometer, fiducial points, cloud detector, programmer, and the network recovery efficiency and instrumentation are also discussed. R.N.A.

N65-28631*# Geophysics Corp. of America, Bedford, Mass.
SOME ASPECTS OF THE ATMOSPHERIC CIRCULATION ON MARS
Wen Tang Washington, NASA, Jul. 1965 45 p refs
(Contract NASw-975)
(NASA-CR-262) CFSTI: HC $2.00/MF $0.50 CSCL 03B

Inferences concerning atmospheric circulation features on Mars are made from analysis and interpretation of some observed Martian cloud systems and from application of meteorological theory to the Martian atmosphere. The trajectories of several cloud systems and the use of two different theoretical criteria suggest the presence of a wave type circulation regime in the mean for the year on Mars. Cloud observations also suggest the presence of sub-tropical high pressure centers, upper level meridional flow at equatorial latitudes, and frontal cloud phenomena at equatorial latitudes. Theoretical estimates of the mean large scale zonal and meridional wind velocities yield values greater than on earth. Theoretical estimates of the maximum surface wind suggest a value greater than 100 m sec^{-1}. Computations of the vertical velocity profile, based upon a simplified "ω" equation, indicate greater large scale vertical velocities than on earth, and a "dynamic" tropopause height of about 20 km. Author

N65-28661# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OVER THE PLANET EARTH

V. Komarov, K. Feoktistov, and B. Yegorov 30 Apr. 1965 20 p Transl. into ENGLISH from Pravda (Moscow), 6–9 Nov. 1964 (FTD-TT-64-1325/1; AD-615257)

An account of the personal reactions of the cosmonauts during the flight of the Voskhod is described. L.S.

N65-28713# Kitt Peak National Observatory, Tucson, Ariz. Space Div.

STRUCTURE OF THE MARTIAN UPPER ATMOSPHERE

Michael B. Mc Elroy, Jean L'Ecuyer (Yerkes Obs.), and Joseph W. Chamberlain [1963] 32 p refs

We have computed a number of models of the Martian thermosphere with various constants and boundary values in the hydrostatic and heat-flux equations. The investigation is divided into two main parts. First, we have varied the basic parameters, one or two at a time, to find to what extent an uncertainty in one of these fundamental parameters affects the derived exospheric temperature and other characteristics of the upper atmosphere. These models are physically oversimplified, but mathematically serve their purpose. Second, with selected specific chemical compositions, we have integrated the equations with allowance for diffusive separation and absorption of sunlight in different spectral regions. A rather detailed and general discussion is included of the efficiency with which photon energy is converted into the kinetic energy of heat in the neutral atmosphere. The computed models are thought to be fairly representative of an actual atmosphere with the assumed compositions. Author

N65-28716# National Academy of Sciences—National Research Council, Washington, D. C. Space Science Board.

UNITED STATES SPACE SCIENCE PROGRAM

[1964] 355 p refs Submitted to COSPAR at its 7th Meeting, Florence, Italy, 8 May 1964

A condensed compilation of reports on United States space-science activities is presented which covers the fields of astronomy; solar physics; energetic particles and fields; ionospheric physics; planetary atmospheres and meteorology; planetology; exobiology; the effect of the space environment on man and other terrestrial organisms; celestial mechanics, trajectory studies, geodesy, and gravity; laboratory astrophysics and other supporting studies; communication satellites; international activities; and NASA tracking and data acquisition system—new developments. E.E.B.

N65-28738*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

A STUDY OF SOLAR-SYSTEM GEOMETRIC PARAMETERS FOR USE AS INTERPLANETARY NAVIGATION AIDS

W. Thomas Blackshear and Katherine G. Johnson Washington, NASA, Jul. 1965 37 p refs

(NASA-TN-D-2890) CFSTI: HC $2.00/MF $0.50 CSCL 03A

Recognizable geometrical changes in the position of celestial bodies which may be observed by a pilot on a typical mission to Mars have been examined. Equations are presented for determining apparent positions of the Sun and planets on the celestial sphere, angular diameter of the bodies, angle between various pairs of the bodies, phases, and possible eclipses and/or occultations. Typical charts are presented which would be useful in planning interplanetary navigational procedures. Author

N65-28744# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

COLONIZING OUTER SPACE

B. Lyapunov 20 Apr. 1965 12 p Transl. into ENGLISH from Kryl'ya Rodiny (USSR), no. 8, 1964 p 23–24 (FTD-TT-64-1181/1+2; AD-615230)

The problems encountered in the establishment of extra-terrestrial stations, manned orbiting stations, and other 'dwellings in ether' are treated. The problems include gravity, weightlessness, food, communication with the earth, solar energy, dangers from radiation and meteors, and construction materials. Author

N65-28849*# National Aeronautics and Space Administration, Washington, D. C.

PLANETARY ATMOSPHERES A Continuing Bibliography, Jan. 1962–Feb. 1965

Jun. 1965 144 p refs

(NASA-SP-7017) CFSTI: MF $1.50 CSCL 03B

A selection of annotated references to unclassified reports and journal articles on planetary atmospheres announced in *Technical Publications Announcements* (TPA), *Scientific and Technical Aerospace Reports* (STAR), and in *International Aerospace Abstracts* (IAA) is presented. Each entry in the bibliography consists of a citation and abstract. The majority of the references pertain to studies, measurements and discussions concerning the atmospheres of Mars, Venus and Jupiter, but a limited number of references to the atmospheres of Mercury and Saturn are also included. The scope of coverage was defined to permit inclusion of references to such specific topics as the theory of planetary origins, extraterrestrial environment, planetary exploration and spacecraft reentry, and the physical properties of the planets. All reports and articles cited were introduced into the NASA Information System during the period January, 1962 to February, 1965. J.L.D.

N65-29009# Goodyear Aerospace Corp., Akron, Ohio.

RICE/WILBERFORCE GRAVITY-GRADIENT DAMPING SYSTEM

A. C. Buxton, D. E. Campbell, and K. Losch 3 Nov. 1964 38 p refs Presented at the ECCANE of the IEEE, Baltimore, 21–23 Oct. 1964

(GER-11749, Rev. A)

The concept and performance of the gravity-gradient damper for application to the NASA Langley lenticular communication satellite are presented. This damper is somewhat similar to the lossy hysteresis spring damper; however, this device is a viscous-fluid damper that exploits resonant rises and the cross-coupling in a helical spring between the plunging and torsional modes, thereby achieving a high-articulation gain that converts the low angular rates of gravity-gradient librations into relatively high rates of rotation in the viscous damper. Thus, the usual limitation of performance of rate-sensitive damping devices in gravity-gradient systems is removed. The damper provides damping about all three axes. For the large-inertia lenticular satellite, the settling-time constants of the transient librations would be about three orbits in pitch and six in roll. Steady-state forced librations of the satellite and damper would be less than 2°. E.E.B.

N65-29042# Hungarian Academy of Sciences, Budapest.

PHOTOELECTRIC OBSERVATIONS OF VV PUPPIS

Merle F. Walker (Lick Obs., Calif. Univ.) 1965 12 p refs /In Mitt. Sternwarte, No. 57

Photometric observations were made using the 120-inch reflector. The observed times of maximum light were used to derive the following improved elements for the light-variation:

$$\text{Max} = \text{JD } 242789.6474 + 0^{d}.0697468256\ E.$$

These elements were used in computing the phase of the observations which are given. The results tend to confirm the constancy of the period reported by earlier observers. The light curves obtained indicated that in yellow light, the system is constant within 0.1 mag. from phase 0.2P to 0.7P, just one-half of the period. In blue and ultraviolet light, the brightness decreased by about 0.1 mag. from 0.2P to 0.7P if the average of the first and second cycles observed is used. The light-curves showed the existence of rapid, intrinsic variations throughout the 100-minute cycle. The amplitude and frequency of these variations appears to be a maximum during maximum light. E.E.B.

N65-29050*# National Aeronautics and Space Administration, Washington, D. C.
THIS IS NASA
[1965] 18 p
(NASA-EP-22) GPO: $0.15; MF $0.50 CSCL 22A

Mission and facilities of NASA and the scope of the space effort are detailed in a booklet for the layman. Responsibilities of NASA headquarters and 14 field installations throughout the country are discussed, and it is mentioned that 60 other countries cooperate in a variety of space explorations projects. A review is given of NASA-conducted aeronautical research and the various projects are discussed under the headings of manned space flight, unmanned satellites and sounding rockets, unmanned lunar and interplanetary spacecraft, application satellites, and launch vehicles. Tracking and data acquisition are mentioned. M.W.R.

31 SPACE VEHICLES

Includes launch vehicles; manned space capsules; clustered and multistage rockets; satellites; sounding rockets and probes; and operating problems. For basic research see: 30 Space Sciences. For related information see also: 28 Propulsion Systems; and 32 Structural Mechanics.

N65-28331*# National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.
SA-10 FLIGHT MECHANICAL SUMMARY Technical Memorandum, Jul. 13, 1965
13 Jul. 1965 71 p refs
(NASA-TM-X-53293) CFSTI: HC $3.00/MF $0.75 CSCL 22D

This report presents the Flight Mechanical Summary for Saturn I vehicle SA-10 to be launched from Pad 37B, Eastern Test Range on a flight azimuth of 95.2 degrees East-of-North. A successful flight will insert the spent S-IV stage and payload consisting of an Apollo boiler-plate (BP-9) and a Meteoroid Technology Satellite (Pegasus C) into a 535 km circular orbit. Included is a discussion of the operational predicted trajectory with its orbital mission objectives and constraints, guidance, sequencing, and insertion parameters. The three-sigma envelope of thrust, flow rate, liftoff mass, and wind speed variations is given, along with impact data, in the Range Safety part of this report. A study of wind disturbances, three-sigma C_1 and C_2 variations, and $\pm 10\%$ control gain deviations shows the vehicle to be structurally capable of withstanding the expected winds during the launch period. Pertinent tracking and telemetry ground coverage data are presented for powered and orbital flight phases. Author

N65-28467*# National Aeronautics and Space Administration, Washington, D. C.
PROJECT SYNCOM
[1965] 8 p Supersedes NASA Facts-C-5-63
(NASA Facts, Vol. II, No. 14; NASA Facts-C-5-63)

A NASA fact sheet on the Syncom synchronous communications satellite is presented. The ground support, orbiting sequence, spacecraft description, and mode of operation is discussed, and a photograph of Syncom with major components labeled is given. Also included is a facts and figures table for the Relay, Telstar, and Syncom satellites. L.S.

N65-28640*# National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.
LIMITS ON OBSERVATIONAL CAPABILITIES OF AEROSPACECRAFT
John C. Evvard Washington, NASA, Jul. 1965 18 p refs
(NASA-TN-D-2933) CFSTI: HC $1.00/MF $0.50 CSCL 22B

The principal limit on the observational capability of aerospacecraft is set by atmospheric turbulence. Most of the effect, however, is due to the distortions of the light path near the surface (up to 15 km), where the air density is high. Hence, the viewing accuracy of a satellite observer looking at the ground is generally much higher than for a ground observer viewing a satellite. The ratios of these positional uncertainties have been estimated by assuming plausible or limiting relations for the instantaneous density gradients in the statistically fluctuating atmosphere. The resulting estimated uncertainty of viewing a point on the ground directly beneath an aerospacecraft need be no larger than 10 centimeters. This value is essentially independent of altitude above about 32 kilometers. Hence, very high flying aircraft would have about the same observational-capability limits as satellites. The minimum required telescope objective diameter, however, to achieve this 10-centimeter resolution must be increased with craft altitude up to 1.9 meters at an altitude of 320 kilometers. Author

N65-28690*# National Aeronautics and Space Administration, Washington, D. C.
FINAL PEGASUS/SATURN WILL CARRY DETACHABLE PANELS
21 Jul. 1965 35 p
(NASA News Release 65-232) CSCL 22B Available from the Scientific and Technical Information Division

A NASA press kit was released giving details on launch preparations for the Pegasus C by the Saturn 10. The meteoroid detector panels used for Pegasus flights are described, and sectional diagrams of the panels are shown. Meteoroid frequency of puncture data are returned by telemetry to the earth, and the data are used in designing future manned and unmanned spacecraft. The outer surface of each panel carries a target sheet of various thicknesses of aluminum, with a sheet of mylar plastic coated with a thin layer of copper bonded to the back of the aluminum sheet. The sandwich forms a capacitor when an electric potential is established between the two metals. The panels are subdivided into 62 logic groups, and the capacitors are interconnected so that the satellite electronics package sees each logic group as one capacitor. A meteoroid hit on any panel is registered as a hit on the logic group in which that panel is located. Telemetry data returned from previous launches of Pegasus I and II confirmed hits on panels of three different thicknesses of aluminum target metal. The flight preparation, sequence, and instrumentation for tracking and data acquisition by the Pegasus C are detailed. L.S.

N65-28847*# General Electric Co., Philadelphia, Pa. Spacecraft Dept.
A STUDY OF DESIGN GUIDELINES FOR STERILIZATION OF SPACECRAFT STRUCTURES Final Report
Huntsville, Ala., NASA. Marshall Space Flight Center, Aug. 1964 393 p refs
(Contract NAS8-11107)
(NASA-CR-61005), CFSTI: HC $7.00/MF $2.00 CSCL 22B

The effects of terminal sterilization on spacecraft and planetary lander structures were investigated, and guidelines for their structural design were established. The two major problems of transient thermal gradients and material degradation due to elevated temperatures were considered, and a simplified model of a typical planetary lander was subjected to a spectrum of thermal environments. Results of the study showed that (1) the thermal environment specified for sterilization is a significant design condition for material selection; (2) the introduction of a sterile atmosphere into the containing canister is preferable to sterilization in a vacuum; (3) a rigid canister design is preferable to a flexible one in maintaining sterility of the planetary lander; and (4) periodic biological load reduction is required during the entire assembly sequence. It was concluded that the design for terminal sterilization imposes a weight penalty for some structural elements, and that many materials experience significant irreversible degradation. No gaps in analytical capability to establish performance in the sterilizing environment were foreseen. W.M.R.

32 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; thermal stress; impact phenomena; vibration; flutter; inflatable structures; and structural tests. For related information see also: 17 Materials, Metallic; and 18 Materials, Nonmetallic.

N65-28062 Joint Publications Research Service, Washington, D. C.
NON-AXISYMMETRIC DEFORMATION OF A THICK ELASTIC PLATE
M. I. Guseyn-Zade *In its* Eng. J. 29 Jun. 1965 p 111–123 refs (See N65-28050 17-23) CFSTI: $6.00

The nonaxisymmetric problem of the equilibrium of a thick circular plate with loads on its boundaries is studied theoretically. Under the assumption that the tangential components of the stresses are equal to zero on the flat boundaries of the plate, expressions for the normal stresses acting on the boundaries are derived by expanding certain Galerkin functions in Fourier-Dini series. It is shown, however, that there is considerable computational difficulty in obtaining numerical results for this three-dimensional elasticity problem. When the system of infinite series equations are replaced by a finite system containing 2N equations, only 2N terms can be computed for the displacements and stresses. J.M.D.

N65-28063 Joint Publications Research Service, Washington, D. C.
STRESS STATE OF A CYLINDRICAL CANTILEVER SHELL UNDER A CONCENTRATED NORMAL FORCE APPLIED TO THE FREE EDGE
I. L. Sharinov *In its* Eng. J. 29 Jun. 1965 p 124–137 refs (See N65-28050 17-23) CFSTI: $6.00

Stress state of a closed cylindrical cantilever shell loaded with a concentrated normal force at the free end is analyzed mathematically. Two moments which characterize this stress state are obtained from a trigonometric series approximation of the integral of an equation for the shallow shell. Variation in these moments with shell length is the same as for the corresponding moments in a shell freely supported at the ends and loaded by a concentrated normal force in the center. The moments decrease with diminishing shell thickness; however, the shell does not become momentless at any point, since even a slight reduction of the thickness leads to a sharp increase in the stresses. J.M.D.

N65-28064 Joint Publications Research Service, Washington, D. C.
ON THE FORM OF AN ISOTENSOID PLATE
I. V. Shirko *In its* Eng. J. 29 Jun. 1965 p 138–145 refs (See N65-28050 17-23) CFSTI: $6.00

The present paper gives the derivation of a system of equations which determine the form of the meridional section, the stress state and the deflections of an isotensoid circular or annular plate subjected to an axisymmetric load. As an example we consider a freely supported plate loaded by a constant pressure. Author

N65-28065 Joint Publications Research Service, Washington, D. C.
ON THE ELASTIC STABILITY OF PLATES
V. G. Zubchaninov *In its* Eng. J. 29 Jun. 1965 p 146–155 refs (See N65-28050 17-23) CFSTI: $6.00

Behavior of the eigenvalues in problems of elasto-plastic stability of plates for structures of low rigidity is studied. Equations describing plate stability for the case where the plastic deformations are small in comparison with the elastic deformations are used for investigation of external forces. Eigenvalue considerations lead to two critical load values which can serve as the bases for engineering calculations in stability analyses of plates in load-increasing or load-relieving structures. J.M.D.

N65-28066 Joint Publications Research Service, Washington, D. C.
SOME PROBLEMS IN THE SELECTION OF OPTIMAL FIBERGLASS STRUCTURE
V. I. Korolev *In its* Eng. J. 29 Jun. 1965 p 156–170 refs (See N65-28050 17-23) CFSTI: $6.00

Methods of forming fiberglass cylindrical shells to support axisymmetric loads are discussed. Continuous winding of a cylindrical shell by unidirectional glass fibers, and optimal winding of cylindrical shells with glass cloth, and a method which combines these two techniques are considered. Expressions are presented for optimal winding and wrapping angles with respect to the generator, and for the load-carrying capacity of the resulting structure. Optimal fiberglass structure of a cylindrical shell stressed by axial compression, uniform external pressure or torsion, are also investigated. J.M.D.

N65-28067 Joint Publications Research Service, Washington, D. C.
DISCONTINUOUS SOLUTIONS OF THE PROBLEM OF FILL PRESSURE ON BULKHEADS
S. Yu. Karinskiy *In its* Eng. J. 29 Jun. 1965 p 171–182 refs (See N65-28050 17-23) CFSTI: $6.00

The presence of stress discontinuity lines in the characteristic grid is studied mathematically with respect to fill pressure on bulkheads. Stress discontinuity lines arise within the

medium, although in the vicinity of the upper point of the wall the stresses in the fill will be continuous. Both active and passive pressure of the fill are considered for rectilinear and curvilinear bulkheads. J.M.D.

N65-28068 Joint Publications Research Service, Washington, D. C.

ELASTIC PLANE VIBRATIONS OF A CIRCULAR CYLINDER

Ya. A. Mindlin *In its* Eng. J. 29 Jun. 1965 p 183–191 refs (See N65-28050 17-23) CFSTI: $6.00

A method previously developed for solution of problems concerning elastic vibrations of a strip with circular cutout is applied for deriving equations to describe the vibrations of a disk. Initial conditions in the form of differential equations, and expressions for the projections of the displacement vector on the circumference serve as the bases for mathematical analysis. J.M.D.

N65-28069 Joint Publications Research Service, Washington, D. C.

AEROELASTIC VIBRATIONS OF A FLIGHT VEHICLE IN A SUPERSONIC AERODYNAMIC FLOW

I. Ye. Shashkov *In its* Eng. J. 29 Jun. 1965 p 192–201 refs (See N65-28050 17-23) CFSTI: $6.00

In deriving equations to describe the aeroelastic vibrations of a finned flight vehicle, the forces are considered to act on the wing and fuselage in individual sections, with interactions limited to the connections between the sections. Increments of the aerodynamic forces with bending vibrations of the body, the combined vibrations of body and wing, and symmetric bending-torsion flutter, are studied mathematically. The approximate theory of symmetric bending flutter is generalized to the case of a cluster of beams, with analysis of both rigid couplings and elastic supports included. J.M.D.

N65-28075 Joint Publications Research Service, Washington, D. C.

SEPARATION OF FRAGMENTS OF A VESSEL BURSTING IN A VACUUM

G. L. Grodzovskiy and F. A. Kukanov *In its* Eng. J. 29 Jun. 1965 p 226–231 ref (See N65-28050 17-23) CFSTI: $6.00

Equations are derived which describe the motion in a force-free field by two parts formed when a gas-filled vessel bursts in a vacuum. The vessel is assumed to have arbitrary volume, and account is taken of the pressure, temperature, and adiabatic exponent of the gas. Two cases are considered: one in which the gas discharge process is isothermal due to heat exchange between the gas and the walls, and a second case in which the vessel is thermally insulated and the gas discharge from the vessel is adiabatic. J.M.D.

N65-28077 Joint Publications Research Service, Washington, D. C.

ANISOTROPIC SEMIPLANE WITH STIFFENED EDGE

T. L. Martynovich *In its* Eng. J. 29 Jun. 1965 p 239–250 refs (See N65-28050 17-23) CFSTI: $6.00

Theoretical properties of an anisotropic semiplane stiffened by an isotropic stringer attached to its outer surface are studied. Equations are derived for an element of the stringer. Assuming the absence of bonding and frictional force between the stringer and the semiplane, equations are obtained for the normal contact pressure. An expression for normal contact pressure is also given for the case where there is a friction force which satisfies the Coulomb law between the stringer and the semiplane. Calculations are presented which show that the tangential stress from stringer bending is a significant factor in determining the contact tangential stresses and forces in the section of the stringer. J.M.D.

N65-28078 Joint Publications Research Service, Washington, D. C.

ON THE ANALYSIS OF THIN HINGED SEMI-INFINITE PLATES LYING ON A TWO-LAYER BASE

M. A. Zheleznikov *In its* Eng. J. 29 Jun. 1965 p 250–257 refs (See N65-28050 17-23) CFSTI: $6.00

To facilitate improved design of airfields and highways fabricated from concrete slabs, the stress state of the whole structure, made up of the slab and its foundation and the earth subgrade, is analyzed theoretically. It is considered that the slabs are semi-infinite and are hinged, with the load applied near the joint. The basic equations used in this study describe slab deflections and the relationship between the deflections and the reaction pressure on the slabs. The equations then derived are for the slab bending, from which the bending moment and shearing force can be obtained, and for the reaction pressure. From these results the stress state at any point of the two-layer foundation can be determined; this permits variation of the geometric and mechanical characteristics of the slab structure to avoid permanent deformations. J.M.D.

N65-28079 Joint Publications Research Service, Washington, D. C.

FLOW OF A THIN LAYER OF PLASTIC MATERIAL ALONG ELASTICALLY DEFORMABLE PLANES

I. A. Kiyko *In its* Eng. J. 29 Jun. 1965 p 257–264 refs (See N65-28050 17-23) CFSTI: $6.00

Flow of a plastic layer between two initially parallel plane surfaces is studied mathematically. The layer is considered to be thin relative to the characteristic linear dimension of the flow region. The surfaces deform elastically under the action of the normal pressure of the flow. The problem involves integrating a system of differential equations which describe the variation in distance between the planes and the two-dimensional pressure of the layer. It is determined that a general solution is not possible, and the analysis proceeds under the assumption of rectangular flow. J.M.D.

N65-28080 Joint Publications Research Service, Washington, D. C.

LARGE DEFORMATIONS OF A CIRCULAR MEMBRANE ATTACHED ALONG THE CONTOUR TO A DEFORMABLE RING

Yu. I. Solodilov *In its* Eng. J. 29 Jun. 1965 p 264–275 refs (See N65-28050 17-23) CFSTI: $6.00

Equilibrium of a circular membrane attached to a deformable supporting ring is studied theoretically. It is assumed that the pressure on the membrane is uniform, and that the deformation of the ring is caused by stretching of the membrane. This model further specifies that the deformation is accompanied by the appearance of two zones on the membrane — stretched and folded zones — whose equilibrium states are formulated separately. In the stretched zone the primary stresses are positive, while in the folded zone the circumferential stress is taken equal to zero. The basic systems of equilibrium equations are derived which describe the behavior of the membrane with large deformation, and analysis shows that the deformability of the ring significantly affects the operation of the membrane. J.M.D.

N65-28081 Joint Publications Research Service, Washington, D. C.

ELASTIC–PLASTIC DEFORMATIONS OF A CYLINDER UNDER COMBINED TORQUE AND TENSILE FORCE

S. D. Laytes *In its* Eng. J. 29 Jun. 1965 p 275–284 refs (See N65-28050 17-23) CFSTI: $6.00

Approximate equations are derived to describe elastic-plastic deformations of a cylinder subject to torsion and tension with combined loading. The calculations are based on the hypothesis that the stress distribution in the yield zones, reached at a definite instant of time in the process of the development of the active elastic-plastic deformation, stabilizes and does not change with further increase of the loading. It is shown that the differential equation for solution of the problem integrates in quadratures for a broad class of loading laws. The solution of five particular cases is carried out to a numerical result. Studies are made of the deformation path and the construction of the curves of the interaction between the forces in the limiting state, with complete plasticity of the section. For the case when the axial force is compressive, the problem of stability in the Euler sense is also considered. J.M.D.

N65-28082 Joint Publications Research Service, Washington, D. C.

ON THE VIBRATIONS OF A SLIGHTLY BENT ROD LOADED BY A VARIABLE LONGITUDINAL FORCE

Yu. V. Osetinskiy *In its* Eng. J. 29 Jun. 1965 p 285–292 refs refs (See N65-28050 17-23) CFSTI: $6.00

A theoretical study of the transitional vibrational processes taking place in a slightly curved rod subject to an alternating axial load is presented. The harmonic analysis is based on a nonlinear relationship between the stress and deformation in the rod material, and a differential equation of motion of the rod. A system of nonlinear differential equations is obtained which can be used to study the steady-state vibrations in the zone of the primary parametric resonance and also the process of the transition through this zone. A hinged and slightly bent I-beam is considered in an example, and the variation of the amplitude with transitions through the resonance is shown in a graph. J.M.D.

N65-28193# Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.

INFLUENCE DIAGRAMS FOR STRESSES AND DISPLACEMENTS IN A TWO-LAYER PAVEMENT SYSTEM FOR AIRFIELDS, PART I

Donald M. Burmister Jan. 1965 72 p refs
(Contract NBy-13009)
(TR-1; AD-614693)

PART I presents Influence Diagrams for Stresses and Deflections in Two-Layer Pavement Systems for Airfields, which are intended to provide the essential background and bases for understanding the character and effectiveness of layered system reinforcing action. Influence diagrams of vertical stresses and shear stresses at intervals of depth in layered systems and deflections at the surface are presented covering suitable ranges of the basic two-layer system parameters. The significance of these influence diagrams are discussed with regard to the character and effectiveness of two layer system reinforcing and to their interacting influences on pavement system performances under wheel loads. The major objectives are to develop a "feeling", intuition, and judgment regarding the nature of vertical stress, shear stress, deflection, and shear deformation phenomena and performances, as essential bases for developing relationships and criteria for design of multi-layer pavement systems. Author

N65-28208# Pennsylvania State Univ., University Park. Dept. of Engineering Mechanics.

A TRIAXIAL EXPERIMENT ON YIELD CONDITION IN PLASTICITY

L. W. Hu, J. Markowitz, and T. A. Bartush Jan. 1965 23 p refs
(Grant AFOSR-127-64)
(AFOSR-SR-65-0313; AD-614574)

A triaxial stress experiment was developed for the determination of the intersections of the initial and subsequent yield surfaces with a hydrostatic stress–principal stress plane. Results of an experiment on Nittany Brass No. 2 of the soft grade were reported. Information so obtained makes it possible for one to see the yield condition in the sense of a three dimensional surface rather than a two dimensional curve as observed in conventional biaxial stress tests. Author

N65-28300# Arizona Univ., Tucson. Engineering Research Lab.

PROCEEDINGS OF THE SYMPOSIUM ON SOIL–STRUCTURE INTERACTION

Sep. 1964 647 p refs Symp. held at Ariz. Univ., Tucson, 8–11 Jun. 1964
(AD-610549)

Soil–structure interaction symposium papers are presented on wave propagation in soil media, ground motion and instrumentation, similitude and model studies, analytical and experimental studies, and design and prototype studies. For individual titles see N65-28301–N65-28322.

N65-28301 Illinois Univ., Urbana. Dept. of Civil Engineering.

THE BASIS OF CURRENT CRITERIA FOR THE DESIGN OF UNDERGROUND PROTECTIVE CONSTRUCTION

N. M. Newmark *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 1–24 (See N65-28300 17-32)

Presented is a discussion of criteria essential to the design of underground protective structures, particularly military structures, which focuses on evaluating the phenomena important to the design of protective construction within the region where the overpressure level is of the order of not more than 200 or 300 lb per sq inch. Of primary concern is whether at this range the direct transmitted stresses through the soil and rock might be of comparable importance to the air-induced stresses. Analyzed are inherent problems associated with ground motion (symmetrical- and unsymmetrical deformation, footing motion, arching, etc..); and problems induced by shock and vibration (elastic and inelastic systems). S.C.W.

N65-28302 IIT Research Inst., Chicago, Ill.

CHARACTERISTICS OF STRESS WAVE PROPAGATION IN SOIL

E. T. Selig *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 26–61 refs (See N65-28300 17-32)

A review is made of the basic characteristics of shock induced stress wave propagation theories and previous research. Attention is primarily devoted to the situations where the slope of the stress-strain curves of the soil decreases with increasing stress or strain, i.e., negative curvature. The effect of elastic, viscoelastic, plastic, locking and general nonlinear, inelastic behavior is discussed. The phenomena are further illustrated by wave propagation experiments in long, horizontal bars of dry sand con- are compared with theoretical predictions. It is shown that dynamic loading from an air shock tube. The observed results are compared with theoretical predictions. It is shown that that the major features of the observed stress waves can be explained

on the basis of the characteristic nonlinear, inelastic stress-strain behavior of the sand without the inclusion of time dependent effects. Author

N65-28303 United Research Services, Burlingame, Calif.
DYNAMIC BEHAVIOR OF GRANULAR MEDIA
James V. Zaccor *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 62–72 refs (See N65-28300 17-32)

Reported are results of an experimental program designed to determine the behavior of granular material (soil medium) under dynamic loading. The primary objectives of the present study focus on demonstrating a qualitative relationship between measured peak particle displacement and the displacement predicted from the measured velocity of the front of the main stress wave; and to indicate the influence of initial stress, or initial effective confining pressures, on the overpressure-strain relationship. Discussed are observations made in connection with traveling waves in which inertial properties play a role. Focused on are precursors propagating ahead of the main stream wave. A close relationship was indicated between the measured precursor wave velocities and seismic velocities measured in the same material. It was found that these precursor velocities are significantly greater than the shock-induced velocities, and that the difference is dependent on both the initial pressure and the applied overpressure. The significance of these observations to design engineering is discussed. Also included are data on shock and reflection phenomena in soil, and limited data which appear to correlate measured attenuation of the peak stress with hydrodynamic attenuation theory. S.C.W.

N65-28304 Army Engineer Waterways Experiment Station, Vicksburg, Miss.
STATIC AND DYNAMIC CONSTRAINED MODULI OF FRENCHMAN FLAT SOILS
A. J. Hendron, Jr. and M. T. Davisson (Illinois Univ., Urbana) *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 73–97 refs (See N65-28300 17-32)

A study of the static and dynamic behavior of Frenchman Flat soils in one-dimensional compression is reported which was designed to determine the feasibility of using present-day procedures for predicting ground motions at pressure levels on the order of several thousands of psi. Presented are results of tests on undisturbed samples of Frenchman Flat silt, and results of a comparative study made with the constrained moduli determined on Frenchman Flat soils by other methods. The following were among the conclusions drawn: At a given stress level the dynamic constrained modulus (rise time of 2 to 3 milliseconds) is approximately twice the static modulus. For rise times of 100 milliseconds or longer the modulus is essentially equal to the undrained static modulus. The constrained modulus is strongly dependent on the stress level. Under actual field conditions for stress levels below the range of 1,000 to 2,000 psi, the rise time of the peak stress should increase with depth because of the concave downward stress–strain relationship. The prediction of ground motions at other sites based on an extrapolation of data requires a careful comparison of the dynamic constrained moduli of playa silt and the soil in question at the pressure levels of interest. S.C.W.

N65-28305 Stanford Research Inst., Menlo Park, Calif. Mechanics Dept.
PROPAGATION OF DYNAMIC STRESSES IN SOIL
Lynn Seaman *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sept. 1964 p 98–104 refs (See N65-28300 17-32)

Reported is a study of one-dimensional wave propagation in noncohesive soils, which was designed to develop methods for predicting the phenomena of wave propagation (attenuation of peak stress and the change in the time constant) on the basis of data from laboratory compression of soil samples. Using results from limited tests, it is concluded that wave propagation characteristics in noncohesive soil can be predicted from laboratory compression tests data. The present predictions, which accurately define the attenuation of peak stress, were based on the use of the linear locking model for the soil. S.C.W.

N65-28306 Sandia Corp., Albuquerque, N. Mex.
FREE FIELD GROUND MOTION PRODUCED BY EXPLOSIONS
William R. Perret *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 107–117 refs (See N65-28300 17-32)

Presented is an analysis of ground motion produced by underground explosions sufficiently deep to develop only negligible air blast, which focuses on determining the most adaptable means of observing the development and attenuation of environmental response to explosion. Reported are comparative data from free-field ground motion measurement programs in several types of rock and soil which demonstrate the consistency of results derived from measurements of particle motion in terms of acceleration or particle velocity, and which illustrate the accuracy of the scaling procedure over a range of explosion yields of two or three orders of magnitude. It is emphasized that perturbations produced by placement of gages react more severely on the response of stress and strain gages than on the response of accelerometers or velocity gages. Included are comparative data which illustrate basic differences between ground motion induced by air blasts and that directly transmitted from underground explosions. S.C.W.

N65-28307 Notre Dame Univ., Ind. Dept. of Civil Engineering.
INERTIAL EFFECTS AND SOIL STRENGTH CRITERIA
B. B. Schimming and H. C. Saxe *In* Ariz. Univ. Proc. of the Symp. on Soil–Struct. Interaction Sep. 1964 p 118–128 refs (See N65-28300 17-32)

Reported are preliminary results of tests on the strength of soils under dynamic loading in which a newly developed dynamic direct shear device was used. The method of load application consists of a pneumatic system which is capable of applying a 1000 pound load to soil specimens in both the vertical and horizontal directions. For all tests described, the normal or confining load was applied statically, either pneumatically or with weights placed on the specimen. The horizontal shear load was applied statically and dynamically. Examined were the static and dynamic strengths of dry Ottawa sand in both a loose and dense state, Jordan Buff clay, sandy silt, lake marl, and silty clay. Also studied was the lateral inertia effect. It was concluded that: (1) the variation in strength of cohesive soils as a function of rate of load application is best reflected by the cohesion parameter; (2) apparent lateral inertial effects observed under boundary conditions different than those imposed by the triaxial test substantiate their existence independent of the testing device, and (3) for soils that dilate when sheared, the inertial forces normal to the failure plane may alter the apparent dynamic strength of the soil. S.C.W.

N65-28308 IIT Research Inst., Chicago, Ill.
A NEW DEVICE FOR SOIL STRAIN MEASUREMENT
W. B. Truesdale and M. E. Anderson *In* Ariz. Univ. Proc. of the Symp. on Soil–Struct. Interaction Sep. 1964 p 129–137 refs (See N65-28300 17-32)

Described is a gage for measuring static and dynamic strains in soil. The gage consists of driver and sensor coils to be placed in the soil, driver and sensor coils on an adjustable precision coil mount, and the electronic auxiliaries. The electronics include an oscillator with a driver amplifier, a signal amplifier, a ring demodulator, filter, and meter. Output terminals are provided for connection to a cathode ray oscilloscope for observing and photographically recording transient strains during dynamic tests. The soil strain gage employs the differential transformer principle: the driver and sensor coil in each set are analogous to primary and secondary transformer windings. The electronics are designed to measure small changes in mutual inductance caused by a change in flux detected by a sensor cell. Discussed are operational procedures (static- and dynamic-measurements), coil displacement parameters, and recommended procedures for placing the gage in dry sand and in compacted soils. S.C.W.

N65-28309 Army Engineer Waterways Experiment Station, Vicksburg, Miss. Engineering Mechanics Section.
SHOCK-ISOLATING BACKPACKING MATERIALS, A REVIEW OF THE STATE OF THE ART
George C. Hoff *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 138–154 refs (See N65-28300 17-32)

Presented is a review of the state of the art of a technique designed to control the magnitude of the forces being applied to buried structures by blast loading. Discussed is the use of backpacking materials for shock isolation of buried structures and the techniques used in determining the energy absorbing characteristics of the backpacking materials. An example is developed to show how backpacking materials, when placed around buried structures, will absorb a portion of the applied shock energy thereby reducing the forces which reach the structure. Presented are comparative data which focuses on the energy-absorbing mechanisms of elasto-plastic materials and plasto-elastic materials. Both materials were considered for use as backpacking. Considered in the investigation were granular materials, foamed plastics, honeycombs, and insulating concretes. S.C.W.

N65-28310 IIT Research Inst., Chicago, Ill.
EFFECTS OF GAUGE DENSITY AND PLACEMENT ON MEASUREMENT OF ACCELERATION IN SOIL
E. T. Selig and R. W. Rusin (Soil Testing Services, Inc.) *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 155–171 refs (See N65-28300 17-32)

A study has been made of the various factors which affect behavior of accelerometers in soil. Previous field and laboratory experience has been reviewed. This is supplemented by an experimental investigation of embedded accelerometers to determine the importance of gauge density and placement procedures on gauge response. The most important factors influencing motion measurement appear to be (1) gauge density in relation to the soil, and (2) placement conditions. Reproducibility of peak acceleration measurements was within ±15% on the average. For a variation in accelerometer density of 45%, a 12% difference in peak accelerations was observed for pendulum tests in sand and a 37% difference for shock tube tests in clay. Changing the static compaction pressures for placement of gauges in clay specimens from 12 psi to 42 psi resulted in a decrease of 22% in the peak accelerations recorded. Author

N65-28311 IIT Research Inst., Chicago, Ill.
A REVIEW OF STRESS AND STRAIN MEASUREMENT IN SOIL
E. T. Selig *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 172–186 refs (See N65-28300 17-32)

Presented is a review of published data on stress and strain measurements in soil which emphasizes the important factors governing gage response, and inherent problems involved in making the measurements. Focused on are experiences encountered during stress measurements. The influence of stress gage response, overall size with respect to soil irregularities, effectiveness of placement, relative stiffness, geometry, nature of the sensing element, density, and frequency response are discussed in view of their importance to reproducibility and consistency of measurements. Also discussed are several of the basic types of gauges which have been used for stress and strain measurements in the field. It is concluded that accurate measurements of stress and strain in the soil are difficult because (1) the gage does not respond like the soil it replaces, and (2) the soil is disturbed during the installation of the gage. S.C.W.

N65-28312 Naval Civil Engineering Lab., Port Hueneme, Calif. Structures Div.
THE BEHAVIOR OF SHALLOW-BURIED CYLINDERS
Jay R. Allgood *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 189–210 refs (See N65-28300 17-32)

Presented is an analysis on the behavior of shallow buried cylinders whose axes are parallel to the ground surface. Focused on are thin metal cylinders with shallow burial in a uniform noncohesive soil field. Reviewed are available data on the behavior of shallow buried cylinders in an attempt to determine the dominant parameters of these cylinders, and to define the areas in which further research is needed. Emphasized are arching and buckling phenomena. Also reviewed are the status of culvert design and the predominant experimental work, and the status of applicable buckling theory. The known aspects of static behavior are discussed to provide the basis for a limited treatment of dynamic response. S.C.W.

N65-28313 Ministry of Defence, Christchurch (England). Structures Group.
BURIED TUBES UNDER SURFACE PRESSURE
P. S. Bulson *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 211–238 (See N65-28300 17-32)

Reported are studies on the deflection and collapse of thin-walled, flexible tubes, buried in compacted sand, when the surface of the sand was under a static vertical overpressure. Examined were unstiffened, open ended, circular and square tubes. Surface loading was achieved by means of a uniform pressure which was applied hydrostatically. Test specimens were made from mild steel sheet and buried so that their longitudinal axes were horizontal. A 5-ft and a 24-ft test rig were used. Presented are results of tests on: circular tubes made from tin plated mild steel sheet; square tubes made from mild steel sheet (constant cover, variable wall thickness); square tubes made from mild steel sheet (constant wall thickness, variable cover); the effect of increasing the corner radius of a square section thin walled tube on collapse pressure; square tubes in the 24 foot rig. Also included are results of an investigation on the role of a granular material surrounding a flexible structure in which a third rig was used. S.C.W.

N65-28314 United Research Services, Burlingame, Calif.
REVIEW OF SOIL–STRUCTURE INTERACTION
Carl K. Wiehle *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 238–245 refs (See N65-28300 17-32)

Presented is an analysis of inherent problems associated with nuclear blast loading on underground structures. Emphasized is the influence of inadequate data on soil–structure interaction phenomena, on the development of reliable design procedures for underground structures subjected to nuclear blast. S.C.W.

N65-28315 Utah State Univ., Logan. Dept. of Mechanical Engineering.
STRUCTURAL DESIGN TRENDS IN BURIED FLEXIBLE CONDUITS
Reynold K. Watkins *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 246–255 refs (See N65-28300 17-32)

Structural design trends in buried flexible conduits are analyzed with emphasis on the need to shorten the lag-time between current research and its reduction to practice due to increased use of soil as a construction material. Reviewed are the history of buried conduit (rigid or flexible) design; trends in the structural design of common soil-conduit systems (pipes and noncircular conduits); and trends in the structural design of special soil-conduit systems (nonsymmetrical loading for relatively rigid pipes, slabs over buried flexible conduits, and cone-shaped soil pipe). Also cited is the need for further research on flexible conduits beneath the water table, cohesive soil, and the difference in soil depth between the crown of pipes and the spring line. S.C.W.

N65-28316 Lehigh Univ., Bethlehem, Pa.
A STUDY OF LOADS ON UNDERGROUND STRUCTURES
D. A. Van Horn *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 256–282 refs (See N65-28300 17-32)

An analytical method is presented for determining the loads on underground structures induced by time-dependent air overpressures of the type resulting from nuclear blasts. The first part is devoted to the development of an analytical method for evaluating the loads produced by static overpressures, and is based on principles set forth as a result of theoretical and experimental work conducted during the period 1908–1952. The major importance of the method of installation of the structure and the fill material is emphasized, and the effects of the various factors related to construction procedure are taken into account in the development. In the second part, the analysis is extended to include the effects of time-dependent overpressures. The method is based on a procedure published in 1960, and reflects the principles set forth in the theory of static loads. Author

N65-28317 IIT Research Inst., Chicago, Ill.
PHOTOELASTIC STUDY OF WAVE PROPAGATION AROUND EMBEDDED STRUCTURAL ELEMENTS
W. F. Riley *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 332–345 refs (See N65-28300 17-32)

Described are several studies which were designed to determine stresses in the free field of a two-dimensional plate, and on the boundaries of embedded structural elements in the plate during passage of a stress wave. Both explosives and traveling air shocks were used to generate the stress waves. Data from studies of circular holes and rigid circular inclusions are presented and compared with equivalent static stresses based on the free field conditions. Results indicate that static solutions can be used as a first approximation for computing dynamic stress distributions on the boundaries of discontinuities in elastic materials if the time-dependent free field stress distributions are known. For all cases studied, the measured dynamic stress did not exceed the computed stress based on the approximate static solution, and the measured dynamic free field stresses, by more than 15%. S.C.W.

N65-28318 New Mexico Univ., Albuquerque. Air Force Shock Tube Facility.
THE RESPONSE OF BURIED CYLINDERS TO QUASI-STATIC OVERPRESSURES
B. A. Donnellan *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 449–463 refs (See N65-28300 17-32)

An experimental study on the response of small buried cylindrical structures to quasi-static overpressures, which was designed to determine the effects of variation in depth of burial on protective structures as culverts and tunnels, is reported. Studied were aluminum cylinders (4 inches in diameter) which were buried with their axes horizontal in dense, dry, 20–30 Ottawa sand. Presented are results of non-destructive tests on instrumented cylinders, and destructive tests on noninstrumented cylinders. Destructive test data demonstrated the great resistance to collapse imparted to a cylinder by burial. Nondestructive test data afforded a comparison between the behavior of a relatively stiff and a relatively flexible cylinder as the depth of burial and the overpressure are changed. Two zones of burial (deep and shallow) are defined. These zones were found to depend on the rigidity of the cylinder and the magnitude of the overpressure. S.C.W.

N65-28319 IIT Research Inst., Chicago, Ill.
RESPONSE OF BURIED STRUCTURAL MODELS TO STATIC AND DYNAMIC OVERPRESSURES
R. L. Marino, Jr. and W. F. Riley *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 464–486 (See N65-28300 17-32)

Reported is a study designed to determine the behavior of a number of simple structural models while buried in a soil medium which was subjected to static and dynamic overpressures. Examined were cylindrical shell structures buried in a dry cohesionless soil medium of uniformly graded silica sand (Ottawa sand). Presented are data on the influence of model stiffness, overpressure level, rate of loading, and the end closure system, on the hoop and longitudinal membrane forces and bending moments in the shells. Also evaluated were experimental procedures and techniques currently employed in the investigation of buried structures. S.C.W.

N65-28320 Minnesota Univ., Minneapolis. Dept. of Civil Engineering.
INTERACTION BETWEEN A SAND AND CYLINDRICAL SHELLS UNDER STATIC AND DYNAMIC LOADING
John Thomas Hanley *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 487–528 refs (See N65-28300 17-32)

The interaction between a vertically oriented cylindrical shell (pipe) and the soil surrounding it (fine, dry, sand) under static and dynamic loading was studied. The primary objectives of the study were: (a) to obtain data on the ratio between the lateral pressure acting on a cylindrical shell in soil and the vertical pressure in the soil at the same depth, (b) to obtain data on the transfer of load between the soil and the shell through shear at the interface, and (c) to determine whether there were fundamental differences in the soil–structure interaction under static and dynamic load. Also analyzed was the performance of equipment used in these studies. Tests confirmed qualitative predictions of the interaction between a

fine sand and simple shell structures responding within the elastic range. The effectiveness of the equipment employed in these studies was also demonstrated. S.C.W.

N65-28321 Northwestern Univ., Evanston, Ill. Technological Inst.
FORCE TRANSMISSION DUE TO COHESIVE SOIL–FOUNDATION INTERACTION UNDER VIBRATORY LOADING
Robert L. Kondner *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 574–582 (See N65-28300 17-32)

The influence of footing size and mass on the dynamic force or stress transmission due to cohesive soil–foundation interaction under vibratory loading was studied. The methods of dimensional analysis in conjunction with kinematic and force parameters in phase diagram form are shown to be useful in analyzing and formulating dynamic stress transmission–deflection response. The results of prototype tests were analyzed for reinforced concrete, circular footings. Focused on were the interaction effects of the size and mass of the foundation, excitation level, and damping. Graphic and analytic data on dynamic stress transmission are included. Speculation is made concerning the importance of derived data to future research on the dynamic force or stress transmission to supporting cohesive soils, and the associated displacement consequence of such transmission due to soil-structure interaction under dynamic loading. S.C.W.

N65-28322 IIT Research Inst., Chicago, Ill.
THE THEORY OF LIMITING EQUILIBRIUM FOR AXISYMMETRIC PROBLEMS: A COMPARISON WITH EXPERIMENT ON SILO SKIN FRICTION
C. J. Costantino and A. Longinow *In* Ariz. Univ. Proc. of the Symp. on Soil-Struct. Interaction Sep. 1964 p 583-592 refs (See N65-28300 17-32)

The theory of limiting equilibrium is used to obtain theoretical predictions of skin friction developed along vertical cylindrical silos embedded in soil which is subjected to a uniform static surface overpressure. Comparison of the results is made with experiments conducted in an Ottawa sand subjected to surface overpressures up to 100 psi. It is found that reasonable agreement between theory and experiment is obtained for tests conducted in dense sands where passive type shear failures are obtained. Results of tests in loose sands do not corroborate the theory, as would be anticipated based upon volume change effects accompanying shearing action. Both analytical and experimental results indicate that the developed skin friction forces are significantly higher than those usually taken into account by current design methods. Author

N65-28367# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
LOW BUCKLING STRESSES OF AXIALLY COMPRESSED CIRCULAR CYLINDRICAL SHELLS OF FINITE LENGTH
Nicholas J. Hoff Jul. 1964 45 p refs
(Contract AF 49(638)-1276)
(SUDAER-192; AD-614928)

Exact solutions are derived of the classical differential equations defining the deformations of axially compressed thin-walled circular cylindrical shells. The end conditions along the circular edges are assumed as the vanishing of (1) the radial displacement; (2) the longitudinal bending moment; (3) the variation in the axial normal stress, and (4) the circumferential membrane shear stress. Under these conditions of simple support the critical value of the uniformly distributed axial normal stress is one-half the classical critical value. Author

N65-28474# National Aerospace Lab., Tokyo (Japan).
INFLUENCE OF LARGE AMPLITUDE ON FLEXUAL VIBRATIONS OF RECTANGULAR ELASTIC PLATES UNDER INITIAL TENSION OR COMPRESSION
Kiiti Tadera, Masazi Koseki, and Hideo Izumi 1965 15 p refs In JAPANESE; ENGLISH summary
(NAL-TR-79)

Approximate solutions for the nonlinear vibrations of rectangular plates under initial tension or compression in the middle plane of the plates are solved employing the Galerkin's method for the case of hinged and clamped edges. The influences of the initial stresses on the period of free vibrations are established. Some numerical examples are given, and it is shown that the above effects are considerably large in the case of compression and consequently of heated plates. Author

N65-28475# National Aerospace Lab., Tokyo (Japan).
NUMERICAL EFFECT OF CONSTRAINTS IN CALCULUS OF THE DIRECT VARIATIONAL METHOD: IN CASE OF PURE TORSIONAL VIBRATION OF THIN WALLED BEAMS OF OPEN CROSS SECTION
Taketoshi Hanawa and Shinichi Koshide 1965 26 p refs In JAPANESE; ENGLISH summary
(NAL-TR-80)

In the previous paper TR-12, the free coupled vibration of the thin walled beams of open cross section with various end conditions were carried out. There, in the case of the cantilevered pure torsional vibration the numerical convergence was not good than the other cases. In this paper this convergence problem was examined, and compared with the results obtained by general variational method, numerically. Also, the effect of the constraint for the test function was obtained numerically. Author

N65-28528# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
SPHERICAL WAVES IN VISCOELASTIC MEDIA
T. M. Lee Apr. 1965 15 p refs
(CRREL-RR-158; AD-615999)

Closed form solutions to the propagation of spherical waves from an internal steady oscillating pressure source as well as to the transient response of a viscoelastic medium to a pressure impulse are presented. The assumption that the loss factors, quantities related to the dissipative property of a viscoelastic medium, are independent of frequency is used here for investigating the wave propagation phenomenon due to the action of an impulse. Numerical examples for the displacement and stress functions have been used to illustrate the damping effect of a viscoelastic medium by comparing with its special case—the elastic medium. It is found that this effect shows its significance with increased traveling distance. Also, in the steady oscillation problems damping is of importance when the vibration frequency is high, while in the transient case it causes the decrease in the peak amplitude and also a time lag in the arrival of the wave front. Author

N65-28652# Litton Systems, Inc., St. Paul, Minn. Applied Sci. Div.
DETERMINATION OF THE SHAPE OF A FREE BALLOON CYLINDER BALLOONS Scientific Report No. 5
Justin H. Smalley 20 Nov. 1964 17 p refs *Its* Rept.-2665
(Contract AF 19(628)-2783)
(AFCRL-65-156; AD-614609) CFSTI: $1.00

Numerical design data for purely cylinder balloons for sigma from zero to nearly 0.4 are presented. Meridional stresses also are given. Only zero superpressure is considered. In

addition, some data are presented which give an insight into the method of solution for the tangent-harness type of balloon. Author

N65-28653# Massachusetts Inst. of Tech., Cambridge. Aeroelastic and Structures Research Lab.
STATIC BUCKLING AND POSTBUCKLING CHARACTERISTICS OF THIN-WALL ALUMINUM CYLINDERS UNDER ECCENTRIC COMPRESSIVE AXIAL LOADS
James J. Kotanchik, Emmett A. Winter, and Theodore H. H. Pian Dec. 1964 60 p refs
(Contract AF 04(694)-427)
(ASRL-TR-121-4; AD-614711)

Results from experimental measurements of buckling threshold and postbuckling characteristics of thin-wall aluminum-alloy circular cylinders loaded at various fixed ratios of axial compressive load to applied bending moment are reported. Buckling modes, both symmetric and antisymmetric, with respect to the plane of loading occurred and are presented. Typical results are shown. Postbuckling measurements of load-deflection characteristics are extended to very large deflections, and include a number of measurements during unloading and reversed loading. Author

N65-28666# Illinois Univ., Urbana. Dept. of Theoretical and Applied Mechanics.
PHOTOELASTIC STUDY OF THE STRESSES NEAR OPENINGS IN PRESSURE VESSELS
C. E. Taylor and N. C. Lind Mar. 1965 100 p refs
(T&AM-270)

Photoelastic tests were performed on a series of models made from epoxy resin to investigate stresses near openings in pressure vessels. Models were designed to reflect the effects of various geometric parameters on the stresses. The procedure for analysis is described, and the probable accuracy is discussed. Summary sheets and curves giving complete stress distributions on outer and inner surfaces are included for each model. From these results, the stress resultant and stress couple may be obtained and compared with solutions derived by shell theory. M.R.W.

N65-28667# Illinois Univ., Urbana. Dept. of Theoretical and Applied Mechanics.
A PAPKOVICH–NEUVER SOLUTION FOR THE STRESS AND DISPLACEMENTS IN AN INFINITELY LONG HOLLOW CIRCULAR CYLINDER Technical Report No. 5
Charles C. Fretwell and Arthur P. Boresi Jun. 1965 67 p refs
(Grant NSF GP-903)
(T&AM-278)

The purpose of this investigation is to develop a solution to the problem of an arbitrarily loaded infinitely long hollow circular cylinder of any thickness. The three dimensional equations of elasticity are taken as the governing equations and the conditions of linear elasticity are assumed. The Papkovich-Neuber solution of the three dimensional equations is used and the solutions of the resulting partial differential equations are given in the form of a Fourier series whose coefficients are infinite integrals. These solutions, which are placed in dimensionless form, are appropriately differentiated to obtain the displacements and stress equations applicable to the problem. By expansion of the boundary conditions into a Fourier series of Fourier integrals, the unknown quantities arising from the integration of the differential equations can be determined and, thus, a complete solution to the problem is found. Finally, applications to the problem are made in the form of constant uniformly distributed spot loads, parabolically distributed spot loads, and exponentially distributed loads and numerical results are presented for some of these applications. Author

N65-28685# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ANALYTICAL AND EXPERIMENTAL DETERMINATION OF THE NATURAL FREQUENCIES AND MODE SHAPES OF SKEW PLATES
Keete Lockett Hester (M.S. Thesis) Mar. 1965 100 p refs
(GAM/Mech/65A-2; AD-615281)

The accuracies of equivalent mass matrices for a triangular and rectangular element based on linearly varying static displacements were tested in natural frequency and mode shapes calculations for a simply supported square plate. Accurancies for the fundamental frequency of a nine degree-of-freedom plate were found within 10%. A lumped mass matrix resulted in an accuracy within 0.5%. The lumped mass and triangular element mass matrix were extended to frequency calculations for 60, 45, and 30 degree simply supported skew plates, each with aspect ratios of 1, 1/2, and 1/3. Results were disappointing when compared to experimental frequencies. Too many inaccuracies existed in the experimental and analytical method. Photographs were taken of mode shapes. Author

N65-28719# Midwest Research Inst., Kansas City, Mo.
RESEARCH ON PANEL FLUTTER
Ronald O. Stearman Dec. 1964 42 p
(Contract AF 49(638)-1324)
(AFOSR-65-0247; AD-614801)

The significant accomplishments attained during the year's research effort include the design and fabrication of a cylindrical shell flutter model, its supporting instrumentation, and a thin shell electroforming facility for fabricating the flutter shells. Author

N65-28745# Litton Systems, Inc., St. Paul, Minn. Applied Science Div.
DETERMINATION OF THE SHAPE OF A FREE BALLOON. CONSIDERATION OF MATERIAL ELASTICITY Scientific Report No. 6
Justin H. Smalley 3 Dec. 1964 32 p refs *Its* Rept.-2704
(Contract AF 19(628)-2783)
(AFCRL-65-157; AD-614625)

This report uses linear membrane theory to determine the effect of material elasticity on the stresses and shape of a free balloon which is originally inelastic. Two cases ace considered: a zero superpressure natural-shape polyethylene balloon of taper-tangent design, and a superpressure Mylar balloon of tangent-harness design. Deformations and stress changes are small in both balloons, except that at the top of the natural-shape balloon, linear membrane theory does not apply and stress changes and deformations are not determined. Reference is made to a non-linear membrane theory which can be used to determine these parameters. Author

N65-28783# Newmark, Hansen and Associates, Urbana, Ill.
DESIGN OF MODEL TEST PROGRAM FOR A BURIED FIELD SHELTER Final Report
N. M. Newmark et al Vicksburg, Miss., U.S. Army Engr. Waterways Expt. Station, May 1965 111 p refs
(Contract DA-22-079-ENG-225)
(Rept.-1-110; AD-465567)

This report is on the development of a standard underground protective shelter to be used by troops in forward battle areas. This structure is designed to withstand a ground surface air overpressure of 100 psi from a megaton size nuclear weapon and the additional nuclear effects associated with the detonation. The shelter is a buried, semicircular arch with a prototype diameter of 16 ft and 48-ft length. The scale of the model developed

is 1 to 4.5. This structure would be prefabricated of wood and steel sections and furnished to commanders in modular kit form so as to minimize necessary construction skills, equipment, and time. Included in this report are: (1) derivation of model scaling laws, (2) selection of model materials, (3) determination of the size of the model from considerations of test container effects such as sidewall friction and loading, (4) estimates of the model response, (5) a recommended testing program, and (6) instrumentation recommended to define the response of the structural model. Author

N65-28788# National Research Council of Canada, Ottawa (Ontario).
A SIMPLE SUBSTITUTE FOR THE TREATMENT OF AIRCRAFT VIBRATION [EIN EINFACHES ERSATZ SYSTEM FUR DIE BEHANDLUNG VON SCHWINGUNGS PROBLEMEN AN FLUGZEUGEN]
M. Hacklinger 1964 15 p refs Transl. into ENGLISH of DVL Bek. No. 268 (West Germany), 1964 21 p
(NRC-TT-1155)

A method is given for reducing an elastic aircraft to a system of two springs and two masses. Special attention is given to: air forces on the wing in flexural oscillation, kinetic energy, fuselage amplitude. The method is suitable for a simplified calculation of gust, landing, and taxiing behaviour, as well as for the evaluation of ground resonance tests. Experimental results are presented for two sailplanes as illustration. Author

N65-28793# Sandia Corp., Albuquerque, N. Mex.
AEROSPACE NUCLEAR SAFETY. SOLVING THE SECOND BOUNDARY VALUE PROBLEM OF ELASTICITY
Ronald O. Hultgren Jul. 1965 12 p refs
(SC-RR-65-307) CFSTI: HC $1.00

When the surface displacements of an elastic plane body are known, the stress distributions and the displacement distribution throughout the body can be determined by the methods of this paper. Applicable cross sections are those which can be conformally mapped to the half plane. Author

N65-28802# Air Vehicle Corp., San Diego, Calif.
DESIGN OF WING SECTIONS FOR USE NEAR THE GROUND
T. Strand and J. J. Brainerd Mar. 1965 177 p refs
(Contract NOw-64-0349-f)
(Rept.-349; AD-465949)

Thin airfoil theory is employed to derive new wing section camber lines for use near the ground. It is shown that the characteristics of a wing section at its ideal angle of attack at design height may be obtained from the linear superposition of 1) a symmetrical airfoil out of ground effect at zero angle of attack, 2) a zero-lift camber line at a small positive angle of attack at the design height, and 3) an additional camber line due to lift at its ideal angle of attack at the design height. The characteristics of one series of airfoils having a prescribed load distribution, and another series having a specified type of additional camber due to lift, are presented in tabular form. The corresponding out-of-ground-effect characteristics of the new series of camber lines are also tabulated. Conformal mapping techniques developed for biplanes are applied to transform the potential flow about an airfoil and its image in the ground plane into the problem of potential flow about two circles with arbitrary circulation in a stream that is uniform at infinity. Author

N65-28829# Lockheed Missiles and Space Co., Sunnyvale, Calif.
EQUATIONS OF THE PROBLEM OF A CIRCULAR PLATE REINFORCED BY RADIAL RIBS
Iu. B. Shul'kin [1964] 4 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Mekh. (Leningrad), no. 2, 1965 p 152-154

Cyclically symmetric deformation of a circular plate reinforced by radial ribs is considered, complying with the conditions for contact between the plate and the ribs. Integral equations are derived for the problem. The hypotheses of straight normals are used. M.R.W.

N65-28955*# Martin Co., Denver, Colo.
THE STABILITY OF SHALLOW SPHERICAL SHELLS UNDER CONCENTRATED LOAD
F. A. Penning and G. A. Thurston Washington, NASA, Jul. 1965 100 p refs
(Contract NASw-912)
(NASA-CR-265) CFSTI: HC $3.00/MF $0.75 CSCL 20K

An experimental and theoretical study was conducted on shallow spherical caps under concentrated load. Aluminum specimens were clamped on the outer edge and tested using load tips with different cross sectional areas. Results from a numerical solution of Reissner's equations gave good agreement with experimental measurements for axisymmetric deflections. The experimental data revealed nonaxisymmetric deflections, upper and lower critical buckling loads, prebuckled and postbuckled deflections, and the existence of several sets of critical loads. A numerical solution to calculate bifurcation loads where asymmetric modes intersect the axisymmetric equilibrium positions failed to predict asymmetric buckling for this problem. Author

N65-28956*# Martin Co., Denver, Colo.
THE BUCKLING STRENGTH OF FILAMENT-WOUND CYLINDERS UNDER AXIAL COMPRESSION
J. Tasi, A. Feldman, and D. A. Stang Washington, NASA, Jul. 1965 68 p
(Contract NASw-912)
(NASA-CR-266) CFSTI: HC $3.00/MF $0.75 CSCL 20K

The buckling strengths of eleven axially compressed filament-wound cylinders with diameter to thickness ratios ranging from 167 to 643 are determined experimentally and analytically. The analytical predictions of buckling loads are made by using linear anisotropic shell theory. The results of the compression tests generally indicate that the cylinders buckled at 65 to 85% of the loads predicted by linear analysis. The composite moduli for each of the cylinders are determined experimentally and are in reasonable agreement with the theory of S. Tsai. Author

N65-28988# Grumman Aircraft Engineering Corp., Bethpage, N. Y.
COMPARISON OF MATRIX FORCE AND DIRECT STIFFNESS METHODS OF REDUNDANT STRUCTURE ANALYSIS
W. E. Falby and J. Zalesak Jan. 1965 19 p refs
(ADR-02-11-65.1)

This report presents a comparison of the stresses from two idealizations of a simple shear-leg stiffened-plate structure, previously analysed and tested for the Air Force by MIT. One idealization consists of bars and shear panel elements, appropriate to the force method, while the other employs "Turner" triangles with nodes at the corners and centroids of these panels. The most recent developments in the techniques are invoked. For engineering purposes, the stress distributions by the two methods are found to be in excellent agreement. Author

N65-29004# Lockheed Missiles and Space Co., Sunnyvale, Calif.
ON THE STABILITY OF A CYLINDRICAL SHELL UNDER LONGITUDINAL IMPACT
V. I. Borisenko [1965] 5 p refs Transl. into ENGLISH from Prikl. Mekhan. (USSR), v. 1, no. 5, 1965 p 100–104

The stability of a hinge-supported cylindrical shell under longitudinal impact by a rigid body is investigated on the basis of the refined wave equations derived from the nonlinear equations of elasticity theory by using a method analogous to that used by S. P. Timoshenko for beams. The solution is found as an eigenfunction series. A comparison is made with results obtained when using the classical equations of shell theory and the wave equations. It is shown that the discrepancy is negligible in the domain of minimum parameters of the impacting body. Author

N65-29049# Pennsylvania State Univ., University Park. Dept. of Engineering Mechanics
SHOCK ANALYSIS OF STRUCTURAL NETWORKS Interim Report No. 1
Vernon H. Neubert Feb. 1964 57 p
(Contract Nonr-656(28)(X))
(AD-431915)

This report contains two separate papers which deal primarily with the effect of position of concentrated mass on response of components and systems. In the first paper the response of uniform clamped-free and hinged-hinged Bernoulli-Euler beams to step velocity ground shock is investigated. Weightless beams carrying concentrated masses are also analyzed to determine the best position for a minimum number of masses in order to match the uniform beam response at low frequencies. In the second paper, the mobility of a uniform bar is presented and compared with that of certain mass and spring systems. It is demonstrated that the mobility of the uniform bar can be matched to a limited extent by certain mass and spring combinations. In subsequent work, it is anticipated that the mobility or impedance behavior will be related to the shock response. In addition to the results presented here, three related graduate projects are in progress. The thesis topics are: the optimum design of beams under ground shock, response of metal beams slightly into the plastic range, and the shock of a simple mass supported by a preloaded spring. The two latter involve modest experimental efforts. Author

N65-29054# Lockheed Missiles and Space Co., Sunnyvale, Calif.
BENDING OF A SPHERICAL SHELL UNDER THE EFFECT OF AN ARBITRARY AXISYMMETRIC LOADING
T. V. Budnikova 23 Jun. 1964 7 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Mekhan. (USSR), no. 2, 1965 p 154–159

Bending of a spherical shell under the effect of a static loading, varying arbitrarily along the meridian is considered. An example in the form of the problem of burdening a shell along concentric circles with a normal loading of constant intensity is solved in the form of an eigenfunction expansion satisfying the boundary conditions. Also, for the particular case of the deflection of a spherical shell without a hole loaded along concentric circles is calculated. E.E.B.

N65-29069# Naval Civil Engineering Lab., Port Hueneme, Calif.
STUDY OF CREEP IN CONCRETE, PHASES 3, 4, AND 5
John R. Keeton May 1965 85 p refs
(R-333-III; AD-615521) CFSTI: $2.25

Tests to determine prestressing losses were made on small rectangular concrete beams loaded in compression by axial prestressing steel stressed to about one-half of the recommended working stress. Relationships were disclosed which indicate the feasibility and practicability of predicting prestressing losses in full-sized beams by testing small prestressed concrete beams of sufficient size variation to provide surface-area-to-volume (SA/V) values for extrapolation curves. Concrete cylindrical specimens were subjected to long-time compressive loading at 1 day of age including 16 hours of steam curing. Creep and shrinkage of steam-cured concrete ranged from 25 to 46% less than that of the same concrete normally cured, the amount depending upon specimen size, applied stress, and storage humidity. Author

N65-29080# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON A FUNCTION CHARACTERIZING ENERGY DISSIPATION IN ELASTIC OSCILLATORY SYSTEMS
P. M. Senik 8 Feb. 1965 15 p refs Transl. into ENGLISH from Vopr. Rasseyaniya Energii Pri Kolebaniyakh Uprugikh Sistem. Tr. Nauchno-Tekhn. Soveshch. (USSR), 1962 p 40–53
(FTD-MT-64-395; AD-614631)

The physical nature and mechanism of the phenomena of energy dissipation during oscillations of elastic systems are investigated. The function characterizing the energy dissipation is determined. The energy dissipation function in equivalently linearized form is discussed. A theoretical analysis of hypotheses used in obtaining an analytical expression which characterizes the energy dissipation is performed. R.N.A.

N65-29082# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROBLEMS OF PLATE FLUTTER IN NONLINEAR ARRANGEMENT
R. D. Stepanov 15 Apr. 1965 14 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Mashinostro. (Moscow), no. 12, 1960 p 46–54
(FTD-TT-64-596/1+2; AD-614943)

Results are given of numerical integration of a system of nonlinear differential equations of autooscillation of a plate with consideration of factors, characterizing the geometric and aerodynamic nonlinearity. TAB

33 THERMODYNAMICS AND COMBUSTION

Includes ablation, cooling, heating, heat transfer, thermal balance, and other thermal effects; and combustion theory. For related information see also: 12 Fluid Mechanics; and 27 Propellants.

N65-28056 Joint Publications Research Service, Washington, D. C.
ORIGINATION CONDITIONS FOR THERMAL CONVECTION IN A POROUS LAYER
P. P. Zolotarev *In its* Eng: J. 29 Jun. 1965 p 51–55 refs
(See N65-28050 17-23) CFSTI: $6.00

Conditions for the appearance of natural convection in a porous layer with a fluid under the action of a geometric temperature gradient are studied theoretically. Density change due

to temperature variation—which is the cause of the convection—is allowed for in the analysis, but density variation under the effect of pressure change is assumed negligible. It is concluded that the initiation of natural thermal convection under the influence of the geometric gradient is apparently possible only for fissured layers with a high degree of fracturing. J.M.D.

N65-28061 Joint Publications Research Service, Washington, D. C.
HEAT EXCHANGE OF A PLATE IN A SUPERSONIC RAREFIED GAS FLOW
Yu. A. Koshmarov and N. M. Gorskaya *In its* Eng. J. 29 Jun. 1965 p 89–110 refs (See N65-28050 17-23) CFSTI: $6.00

Experimental studies of the heat exchange and the equilibrium temperature of a plate in an air flow at zero angle of attack with Mach numbers from 2.6 to 9.8 are reported. The studies cover flow regimes ranging from nearly free-molecular flow, to continuum flow over nearly the entire plate surface which is a regime characterized by strong interaction of the boundary layer with the inviscid stream. Semiempirical equations for the calculation of the heat exchange of a thin plate in a supersonic stream of rarefied gas are presented. J.M.D.

N65-28076 Joint Publications Research Service, Washington, D. C.
ON THE CHOICE OF THE CHARACTERISTIC DIMENSION OF AN AXISYMMETRIC BODY OF GIVEN SHAPE, OPTIMAL WITH RESPECT TO HEAT TRANSFER CONDITIONS
V. A. Bashkin *In its* Eng. J. 29 Jun. 1965 p 232–239 refs (See N65-28050 17-23) CFSTI: $6.00

Equations are given for selection of optimal dimensions of a body of revolution in a supersonic flow of a perfect gas at zero angle of attack. An example is worked in which an optimal value is calculated for the radius of the nose of a circular, spherically blunted cone with a halfangle of 10°. The calculations show that a change of the blunting radius of ±10% increases the total heat flux by less than 1%, and that a deviation from the optimum in the direction of a smaller radius causes a greater increase of the total heat flux. J.M.D.

N65-28106# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FREE THERMAL CONVECTION NEAR THE LINEAR SOURCE OF HEAT
A. S. Asaturyan and B. A. Tonkoshkurov 15 Jan. 1965 15 p refs Transl. into ENGLISH from Transport i Khranenive Nefti i Gaza (Moscow), no. 1, 1961 p 29–41
(FTD-TT-64-760/1+2; AD-610372)

The solution of problems of free thermal convection by similarity theory is considered. The equation

$$Nu = f(GrPr)$$

where Gr is the Grasshof parameter, Pr is the Prandtl parameter, and Nu is the Nusselt parameter that is discussed, and the form of the function f is obtained with the aid of an integral ratio. Also, the stationary thermal convection near a horizontal cylinder of infinite length is explored. E.E.B.

N65-28107# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TEMPERATURE OF A CONE IN SUPERSONIC FLOW WITH CONSIDERATION OF RADIATION
I. N. Sokolova 15 Jan. 1965 12 p refs Transl. into ENGLISH from the book "Sbornik Teoreticheskikh Rabot po Aerodinamike" Moscow, Oborongiz, 1957 p 222–229
(FTD-TT-64-766/1+2; AD-610329)

The solution of laminary boundary equations of a cone for radiation effects can be reduced to the solution of equations similar to the equations for a plate. The radiation of an absolutely heat conductive cone is shown to be $\sqrt{3/2}$ of the radiation of an absolutely heat conductive plate. Also, the radiation of an absolutely nonconductive cone is $\sqrt{3/2}$ of the radiation of an absolutely nonconductive plate. E.E.B.

N65-28359# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EFFECT OF PRESSURE ON THE COMBUSTION STABILITY OF EXPLOSIVES
K. K. Andreyev and V. V. Gorbunov 14 Apr. 1965 8 p refs Transl. into ENGLISH from Zh. Vses. Khim. Obshch. (USSR), v. 8, no. 5, 1963 p 592
(FTD-TT-64-1258/1; AD-614963)

Changes in various combustion phenomena with pressure are reported for potassium picrate and tetryl. Author

N65-28360# Naval Ordnance Test Station, China Lake, Calif.
THE EFFECT OF AN INTENSE MAGNETIC FIELD ON ROCKET NOZZLE HEAT TRANSFER. PART 2: CRYOGENIC ELECTROMAGNET EXPERIMENTS
Leroy J. Krzycki and James B. Lee Mar. 1965 48 p refs
(NAVWEPS-8494, Pt. 2; NOTS-TP-3545; AD-615734)

This report describes a theoretical and experimental investigation of the effect of an axial magnetic field on rocket nozzle heat transfer. The expected reduction in heat transfer was predicated on the anisotropy in the transport coefficients of a partially ionized gas in a magnetic field. Calculations of the electrical properties of the nozzle core and boundary layer gases were made using advanced chemical equilibrium and boundary layer heat transfer computer programs. The gas electrical conductivity and electron density decreased by a factor of ten in the turbulent boundary layer and by an even greater factor in the laminar sub-layer. A 5.3-T magnetic field, generated by a force-cooled cryogenic electromagnet, failed to produce a detectable change in the heat transfer from the seeded hydrocarbon combustion gases to a water-cooled copper rocket nozzle wall. The boundary layer gases were insufficiently ionized for a measurable interaction with the magnetic field. Author

N65-28448*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
HEAT-TRANSFER MEASUREMENTS ON A BLUNT SPHERICAL-SEGMENT NOSE TO A MACH NUMBER OF 15.1 AND FLIGHT PERFORMANCE OF THE ROCKET-PROPELLED MODEL TO A MACH NUMBER OF 17.8
Charles B. Rumsey and Dorothy B. Lee Washington, NASA, Nov. 1959 48 p refs
(NASA-TM-X-77) CFSTI: HC $2.00/MF $0.50 CSCL 20M (Declassified)

A five-stage rocket-propelled model was flight tested to a Mach number of 17.8 and heat-transfer measurements were obtained on the blunt spherical-segment nose and cylindrical body to a Mach number of 15.1 at a Reynolds number of 0.77×10^6 based on nose diameter. The ratio of nose radius to radius of curvature was 0.444. At and near the stagnation point, the experimental heating rates agreed within 20 percent with theoretical laminar rates for equilibrium dissociated air. At other locations on the spherical-segment face the

experimental values differed by as much as 50 percent from the distribution predicted by a simplified theory for laminar flow. On the cylindrical body, within 0.29 diameter of the corner, the experimental heating rates were roughly 10 percent of the stagnation-point rates. Author

N65-28468# National Aerospace Lab., Tokyo (Japan).
STABILITY OF THE MELTED LAYER NEAR THE AXISYMMETRIC STAGNATION POINT
Yasuhiko Aihara 1964 15 p refs In JAPANESE; ENGLISH summary
(NAL-TR-73)

Stability of the melted layer near the axisymmetric stagnation point was investigated both experimentally and theoretically. Experiments were performed in a 30 kW continuous plasma wind tunnel melting the flat stagnation regions of copper, iron, and brass cylindrical rods. Instabilities of the melted layer were observed in these experiments, and it was interpreted that these instabilities were due to the unbalance of the flow rates from the stagnation point to the surrounding region in the melted layer. This was confirmed by the linearized stability theory, which led to the conclusion that towards the downstream of an axisymmetric stagnation point, periodic azimuthal unevenness was amplified on the surface of the melted layer. Author

N65-28490# France. Ministère de l'Air, Paris.
CONTRIBUTION TO THE STUDY OF THERMOKINETICS: THE DETERMINATION OF THERMIC CONSTANTS OF SOLIDS BY MEANS OF THE METHODS OF VARIABLE MODES [CONTRIBUTION A L'ETUDE DE LA THERMOCINETIQUE: LA DETERMINATION DES CONSTANTES THERMIQUES DES SOLIDES AU MOYEN DES METHODES DE REGIME VARIABLE]
Jean Martinet Ser. de Doc. Sci. et Tech. de L'Armement, 1965 117 p refs In FRENCH *Its* Publ. Sci. et Tech. No. 411

In light of the determination, by means of the method of variable mode, of any two of the following thermal constants relative to a homogeneous solid—conductivity, specific heat, diffusivity, and capture coefficient, for a group of particular cases—a theoretical study was made with several empirical examples. Two extra chapters are given to a brief treatment of the method of measuring superficial temperature and caloric flux. Transl. by J.G.

N65-28493# France. Ministère de l'Air, Paris.
COMPARATIVE STUDY OF THE INFLUENCE OF SURFACE STATE OF A METAL ON HEAT RADIATION AND ADJUSTMENT [ETUDE COMPAREE DE L'INFLUENCE DE L'ETAT DE SURFACE D'UN METAL SUR LE RAYONNEMENT ET L'ACCOMMODATION THERMIQUES]
Daniel Paulmier Ser. de Doc. Sci. et Tech. de l'Armement, 1965 80 p refs In FRENCH *Its* Publ. Sci. et Tech. No. 413

Very different surface conditions on fine nickel wires are obtained both by electrolysis and by sublimation. A theoretical study allows for the determination of the influence of supports on the temperature distribution along the wire heated by the Joule effect, and justifies the experimental approach. The total emission of nickel and the accommodation of rare gases on the metallic surface vary as a function of the surface condition, however the scale of surface roughness affects these two phenomena differently. Trans. by J.G.

N65-28505# France. Office National d'Etudes et de Recherches Aerospatiales, Chatillon-sous-Bagneux.
SEVERAL RESULTS ON HEAT CHARACTERISTICS OF TURBULENT BOUNDARY LAYERS BY RAISED TEMPERATURE [QUELQUES RESULTATS SUR LES CARACTERISTIQUES THERMIQUES DES COUCHES LIMITES TURBULENTES A TEMPERATURE ELEVEE]
Roger Michel and Pierre Mentré (1965) 25 p refs In FRENCH Presented at the Meeting of the Fluid Mech. Group, AGARD, Naples, 10–14 May 1965
(ONERA-TP-216(1965))

The problem of heat transfer in a turbulent regime is very critical in certain cases of hypersonic flight; for example reentry of a space vehicle into the terrestrial atmosphere. An analysis of the thermal properties of turbulent boundary layers at high temperatures is made in order to give a reasonable estimate of the heat transfer to the surface of such a vehicle. The properties of a turbulent boundary layer with uniform cooling are analyzed, and thermal and dynamic problems are treated separately. The analysis is first made for an ideal gas and then for a real gas, especially for the case of a dissociating diatomic gas. The determination of skin friction is based on a concept of reference enthalpy. In the case of a pressure gradient, the calculation of heat transfer to the surface requires integration of the total energy equation. This is applied to the case of a hemispherical forebody for different positions of the transition region in a perfect gas. In the case of real gas, the heat transfer is calculated both for an equilibrium gas and a reacting gas, taking into account the influence of the catalytic action of the surface. Trans. by E.W.

N65-28516# Centre National d'Etudes Spatiales, Paris (France). Div. Satellites.
SPECTRAL MEASUREMENT OF SOLAR ABSORPTANCE [MESURE SPECTRALE DE L'ABSORPTANCE SOLAIRE]
J. F. Faugère May 1965 20 p refs In FRENCH
(CNES-NT-2)

After some generalities, the author describes the apparatus for measurement and for the fabrication of reference for reflection. The results of measurement carried on revetments used by the National Center of Space Studies are then given. The report closes with an experimental evaluation of the errors due to the eventual ignorance of the directional models of reflection. Trans. by J.G.

N65-28606# Rocket Power, Inc., Pasadena, Calif. Research Labs.
STUDY OF ROCKET ENGINE EXHAUST PRODUCTS Quarterly Report, 1 Feb.–30 Apr. 1965
M. A. Greenbaum, R. E. Yates, J. A. Blauer, M. A. Frisch, M. Arshadi et al [1965] 23 p refs
(Contract AF 04(611)-7414)
(QR-15; AD-465142)

An intensive study of the surface effects on the equilibrium:

$$BeO(c) + H_2O(g) = Be(OH)_2(g)$$

has been made at four temperatures in the range 1567 to 1808° K. The equilibrium is extremely sensitive to the surface area of the crystalline beryllium oxide. The data have been interpreted and extrapolated to yield a free energy of formation at 298° K of −158.4 ±0.7 kcal/mole for gaseous $Be(OH)_2$. Author

N65-28617# Harry Diamond Labs., Washington, D. C.
EQUILIBRIUM THERMODYNAMIC PROPERTIES OF AIR BEHIND INCIDENT NORMAL SHOCK WAVES
Harry J. Davis 30 Mar. 1965 38 p refs
(HDL-TM-65-17; AD-615273)

The equilibrium temperature, density, and pressure of air behind incident normal shock waves have been calculated. The resulting tables include the effects of chemical reactions, excitation, dissociation, ionization, van der Waal and Coulomb forces. The tables are presented as functions of the ratio of the density behind the shock wave ρ_2 to the density at standard conditions ρ_o: $-7.0 \leq \log(\rho_2/\rho_o) \leq 2.4$, in steps of 0.2. The temperature behind the shock wave T_2 is a parameter which ranges from 2000° K to 16,000° K in 1000° K steps. Two sets of tables, for initial conditions of 273.15° and 300.0° K, are presented. The densities of air, as a real and as an ideal gas, are compared. Author

N65-28625*# General Electric Co., Cincinnati, Ohio. Space Power and Propulsion Section.
ALKALI METALS BOILING AND CONDENSING INVESTIGATIONS Quarterly Progress Report No. 11, 1 Jan.–31 Mar. 1965
F. E. Tippets and G. L. Converse, ed. 23 Apr. 1965 653 p refs
(Contract NAS3-2528)
(NASA-CR-54405) CFSTI: HC $9.53/MF $3.00 CSCL 20M

Experimentation to determine two-phase heat transfer and fluid flow data for potassium under conditions of boiling and condensing approximating those anticipated in large space turbo-electric power systems is reported for the 50 kW, 100 kW, and 300 kW facilities. The results for the 300 kW project show the dependence of heat transfer performance on saturation temperature level, tube exit quality, mass velocity and heat flux, the difference in performance between co-current and counter-current flow, and the effect of the helical insert compared to performance with a plain tube without insert. Tests on the 100 kW project included operation to obtain nucleate boiling heat transfer coefficient data over the range of saturations from 1800° to 2100° F, mass velocities from 16 to 30 lbs/sec-ft^2, and heat fluxes from 60 000 to 150 000 Btu/hr-ft^2. Data are tabulated for all three projects together with description of the testing programs, analysis of data, and instrumentation. E.E.B.

N65-28639*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HEAT-TRANSFER AND PRESSURE DROP CORRELATIONS FOR HYDROGEN AND NITROGEN FLOWING THROUGH TUNGSTEN WIRE MESH AT TEMPERATURES TO 5200° R
Byron L. Siegel, William L. Maag, Jack G. Slaby, and William F. Mattson Washington, Nasa, Jul. 1965 29 p refs
(NASA-TN-D-2924) CFSTI: HC $2.00/MF $0.50 CSCL 20M

Correlations for variable property heat-transfer and friction pressure drop data were obtained for forced convection of hydrogen and nitrogen through electrically heated tungsten wire mesh. These correlations represent the data of six different helically coiled wire meshes for the following range of conditions: (1) mesh porosity of 64 to 72.2 percent (2) wire diameter of 0.020 to 0.035 inch (3) surface temperature of 1400° to 5200° R (4) outlet gas temperature of 600° to 2400° R (5) mass velocity for hydrogen of 0.4 to 3.1 lb/(sec) (sq ft) and for nitrogen of 4.5 to 10.2 lb/(sec) (sq ft) (6) heat flux of 0.5 to 8.3 Btu/(sec) (sq in.) and (7) pressure level of 1 atmosphere. The effect of flow bypass, resulting from a mesh heater not filling the flow passage, was investigated on a 0.030-inch-diameter wire mesh for a bypass area of 25 percent. Author

N65-28644# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A METHOD FOR THE THERMAL ANALYSIS OF ELECTRICAL MACHINES HAVING DIRECT COOLING
N. P. Ivanov and I. F. Filippov 21 Apr. 1965 16 p Transl. into ENGLISH from Elektrichestvo (Moscow), no. 1, 1963 p 17–21
(FTD-TT-64-1296/1+2; AD-615255)

Calculations by mathematical models are used for determining effects of thermal conditions on the magnitude of power of electric machines (i.e. the efficiency of the machine). Relative values for sustained power loss due to cooling the machine are derived. Graphs are presented showing the dependency of sustained power loss due to cooling, upon the delivery of the cooling medium, upon the surface of heat exchange, upon the heat transfer coefficient, and upon the specific volumetric heat of cooling medium. Another graph shows the dependency of cooling surface and water consumption upon the volume of the rotor drum. Relative power changes in the machine, when changing over from one cooling system into another were also calculated. L.S.

N65-28660# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OSCILLATION OF AN ORTHOTROPIC TAPERED SHELL IN A VARIABLE TEMPERATURE FIELD
S. A. Ambartsumyan and S. M. Durgar'yan 15 Apr. 1965 10 p refs Transl. into ENGLISH from Dokl. Akad. Nauk Arm. SSR (USSR), v. 38, no. 2, 1964 p 87–92
(FTD-TT-64-1153/1; AD-615219)

Equations of motion (of equilibrium) are computed for the problem of free oscillation of a very tapered orthotropic shell of positive Gaussian curvature and thickness, taking place in the field of action of high temperatures. It is assumed that the shell is referred to the orthogonal curvilinear system of three dimensional coordinates, the material of the shell is subject to Hooke's generalized law, and at each point there are three planes of elastic symmetry which are parallel to the coordinate surfaces. Through the formulas considered, the components of the tangential deformation, and moments can both be expressed through the function of stresses. L.S.

N65-28665# Pittsburgh Univ., Pa. School of Engineering and Mines.
AXIAL TEMPERATURE GRADIENT IN FLOW WITH SURFACE BOILING
Roger Fuller Tracy, Jr. (M.S. Thesis) Mar. 1965 82 p refs
(AD-614664)

The purpose of the investigation was to determine how the temperature of subcooled water varies as it flowed through a heated pipe. The inside wall temperature of the pipe was high enough to cause surface boiling. It was seen that the water temperature did not increase for approximately the first foot along the test section. It was felt that this reflected the period required for the thermal boundary layer to grow to its fully developed form. Several approximations to heat transfer theory were used to arrive at an expression for the distance required for the boundary layer to develop. Agreement with experimental results was within thirty-five percent. In runs where the saturation state was attained the maximum temperature was always greater than saturation temperature. It is assumed that bubbles of superheated steam in the water caused the thermocouples to sense an average temperature between saturated water and superheated steam. It was also noted that in some cases the temperature continued to increase in this region. Not enough is known about two phase mixtures to be able to explain this pattern. Author

N65-28674*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CONVECTIVE HEAT TRANSFER IN PLANETARY GASES
Joseph G. Marvin and George S. Deiwert Washington, NASA, Jul. 1965 49 p refs
(NASA-TR-R-224) CFSTI: HC $2.00/MF $0.50 CSCL 20M

Equilibrium convective heat transfer in several real gases was investigated. The gases considered were air, nitrogen, hydrogen, carbon dioxide, and argon. Solutions to the similar form of the boundary-layer equations were obtained for flight velocities to 30,000 ft/sec for a range of parameters sufficient to define the effects of pressure level, pressure gradient, boundary-layer-edge velocity, and wall temperature. Results are presented for stagnation-point heating and for the heating-rate distribution. For the range of parameters investigated the wall heat transfer depended on the transport properties near the wall and precise evaluation of properties in the high-energy portions of the boundary layer was not needed. A correlation of the solutions to the boundary-layer equations was obtained which depended only on the low temperature properties of the gases. This result can be used to evaluate the heat transfer in gases other than those considered. For each gas, correlation equations of boundary-layer thermodynamic and transport properties as a function of enthalpy are given for a wide range of pressures to a maximum enthalpy of 18,000 Btu/lb.
Author

N65-28678# General Dynamics/Convair, San Diego, Calif.
THE EFFECTS OF ACTIVE COOLING ON THE AERODYNAMIC AND AEROTHERMODYNAMIC CHARACTERISTICS OF SLENDER BODIES OF REVOLUTION
B. M. Leadon, Jan. Rosciszenski, W. H. Gallaher, W. R. Holst, and W. V. Carter Dec. 1964 103 p refs
(Contract AF 33(657)-11679)
(AFFDL-TR-64-187; AD-615471)

A new self consistent method has been developed for calculation of boundary layer with mass injection. The system of partial differential equations is reduced to a system of ordinary differential equations by integration over different strips. The velocity and enthalpy profiles are assumed to be expressed by series of error functions. A method of calculating the initial velocity and enthalpy profiles, based on an analysis of singularity, is presented herein. The calculation of the initial profiles is reduced to the solution of a system of transcendental equations. The initial derivatives are calculated from linearized equations near the singular points and provide a smooth start of integration of the downstream equations. The present method was applied to the cases of a sharp edged body and a blunt body. In addition to the velocity and enthalpy profiles, the pressure distribution and shock layer thickness can be calculated from generalized Newtonian expressions developed as a part of this effort.
Author

N65-28684# Bureau of Mines, Pittsburgh, Pa.
FIRE AND EXPLOSION HAZARDS OF FLIGHT VEHICLE COMBUSTIBLES Final Report, 2 Jan. 1964–2 Jan. 1965
E. L. Litchfield and H. E. Perlee Wright-Patterson AFB, Ohio, AF Aero Propulsion Lab., Mar. 1965 29 p. refs
(AFAPL-TR-65-28; AD-614694)

Severe explosion hazards could result from a massive spill of nonhypergolic fuel and oxidizer of a missile propulsion system; this problem would be especially severe with the high-energy systems where one or both of the propellent components are cryogens. The sensitivity of two such systems, liquid hydrogen + solid oxygen + diluent and liquid oxygen + solid hydrocarbon + diluent, has been investigated employing a projectile impact to determine the shock required to detonate these mixtures. With no diluent, each explosive system is initiated by a shock stimulus of 1.0 to 2.5 kbar. The explosive yields are such that 1-lb cryogenic mixture is equivalent to 0.6 to 2.0 lb TNT. Sodium chloride, nitrogen, and methyl chloride had inert desensitizing effects upon the liquid hydrogen mixtures but did not reduce the explosive yield. Sodium chloride and nitrogen desensitized the liquid oxygen system; sodium chloride or water reduced the explosive yield of this system.
Author

N65-28688 Purdue Univ., Lafayette, Ind. Thermophysical Properties Research Center
DATA BOOK. VOLUME 2: NONMETALLIC ELEMENTS, COMPOUNDS AND MIXTURES (IN LIQUID AND GASEOUS STATES AT NORMAL TEMPERATURE AND PRESSURE)
Jun. 1965 20 p refs
(Contract AF 33(613)-2281)

Data sheets (including departure graphs and tables) are presented for thermal conductivity of nonmetallic elements and their compounds in the liquid and gaseous states at normal temperature and pressure.
L.S.

N65-28689 Purdue Univ., Lafayette, Ind. Thermophysical Properties Research Center.
DATA BOOK. VOLUME 3: NONMETALLIC ELEMENTS, COMPOUNDS AND MIXTURES (IN SOLID STATE AT NORMAL TEMPERATURE AND PRESSURE)
Jun. 1965 66 p refs
(Contract AF 33(613)-2281)

Data sheets (including specification tables and graphs) are presented for thermal conductivity and thermal diffusivity of nonmetallic elements, compounds, and mixtures in the solid state at normal temperature and pressure.
L.S.

N65-28729 Joint Publications Research Service, Washington, D. C.
A CATALYTIC PROCESS AS AN OBJECT OF A SELF-ADJUSTING SYSTEM
A. I. Shelomanov, V. B. Skomorokhov, and O. A. Malinovskaya *In its* Develop. in Cybernetics Res. 12 Jul. 1965 p 29–36 refs (See N65-28725 17-10) CFSTI: $3.00

The theoretical possibility of controling the operation of a through flow catalytic reactor with an ideal mixing layer at the middle stationary regime was demonstrated. Results indicated that the use of the suggested method can significantly reduce capital expenditures and operational costs for identical equipment productivity. The method can be used as the basis for the design of systems for control or for use as an algorithm for didgital computers.
R.N.A.

N65-28742# Army Missile Command, Huntsville, Ala. Stress and Thermodynamics Analysis Branch.
THEORETICAL EFFECTS OF REENTRY AERODYNAMIC HEATING ON THE EXTERNAL SKIN STRUCTURE OF AMRAD EXPERIMENT NUMBER ONE
W. G. Burleson and R. A. Reynolds 30 Apr. 1965 41 p refs
(ARPA Order 198; Proj. Defender)
(RS-TR-65-3; AD-466898)

Calculated reentry aerodynamic heating effects on the external skin of an ICBM reentry test vehicle having a relatively low weight-to-drag ratio are presented in this report. The vehicle is a blunt cone with the aft portion designed to fail just after maximum heating and the forward portion designed to survive to impact. The tape-wound, reinforced plastic heat shield is subjected to maximum reentry heating rates between 125×10^4 and 650×10^4 kcal/m^2hr. Resulting external and internal surface temperature histories are given. Effects

of extreme trajectory, vehicle characteristics, and atmosphere variations on the aluminum substructure temperature histories are discussed. Author

N65-28850*# National Bureau of Standards, Washington, D. C.
VAPORIZATION OF THERMIONIC REFRACTORY MATERIALS Final Report
E. R. Plante 30 Apr. 1965 15 p refs
(NASA Order R-57)
(NASA-CR-63845; NBS-8694) CFSTI: HC $1.00/MF $0.50 CSCL 20M

The objective, method of measurement, apparatus, and results obtained from research on the Langmuir vaporization of refractory materials are discussed. Rate of vaporization measurements were carried out on Ru, Os, W, and Re. Additionally, measurements on samples reported to have nominal compositions of TaB and Ta_2N were attempted but did not yield reproducible results. One observation of interest made during the ruthenium rate of vaporization measurements involved the gradual departure of the measured rate of vaporization at low temperatures from the curve predicted on basis of measurements made at higher temperatures. This behavior had been noted previously in studies on platinum. Also, one important difference was noted between rhenium and other materials studied was that Re has highly volatile oxides, Re_2O_7 with a boiling point of 634° K or perhaps ReO_2 which once formed tend to migrate away from the hot zone and could escape past the shutter to the window. E.E.B.

N65-28852*# Denver Research Inst., Colo.
[THEORETICAL STUDIES ON THE RELATIONSHIP BETWEEN THE THERMIONIC WORK FUNCTION OF REFRACTORY INTERMETALLIC COMPOUNDS AND THEIR ELECTRONIC AND CRYSTAL STRUCTURES] Progress Report Letter, 1 Jul.–31 Dec. 1964
C. Samuel Miller and Jerry D. Plunkett 31 Dec. 1964 4 p
(Grant NsG-365)
(NASA-CR-63840) CFSTI: HC $1.00/MF $0.50 CSCL 20M

The high temperature vacuum furnace is complete and is ready for the annealing treatment phase of the project. Two methods are discussed for measuring the temperature of the electron emitting cathode. The method selected uses a hollow tube electrically heated with an axial flow of current to incandescent temperatures with a small blackbody hole near the midpoint of the tube. Emittance data are obtained by alternately observing the specimen surface and the blackbody hole with an optical pyrometer. Also, a 15 kV pulse generator capable of producing pulses of a wide range of widths and pulsing rates was constructed. Diode fabrication and related problems are also discussed. E.E.B.

N65-28890# Central Technical Inst., TNO, The Hague (Netherlands).
RESEARCH ON THE INFLUENCE OF THE CONDITIONS OF FLOW, SUBCOOLING AND COMPOSITION, ON THE BURN-OUT HEAT FLUX OF POLYPHENYL REACTOR COOLING AGENTS
M. L. G. Van Gasselt and D. A. Van Meel Brussels, EURATOM, 1965 21 p refs
(Contract EURATOM-097-63-6 ORGN)
(EUR-2299.e) Available from Belg. Am. Bank and Trust Co., New York, Account No. 22.186: 40 Belg. Fr.

The burn-out was studied for upward forced flow through a vertical round stainless steel tube heated by the Joule effect using direct current. The dimensions of the tube were: internal diameter 5 mm, wall thickness 0.25 mm, length 500 mm. The experiments were limited to the condition of subcooled boiling at the heating surface. To be able to establish the degree of subcooling of complex mixtures a vapour pressure apparatus has been developed. Vapour pressures are reported of mixtures of terphenyls and benzene or diphenyl. Burn-out heat sources as a function of mass velocity and degree of subcooling are presented for the Progil terphenyl mixtures OM2 and OM1 which were directly pressurized with nitrogen, for degassed OM2 and for the systems OM2-benzene and OM2-diphenyl. Author

N65-28898# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A POWERFUL EXPLOSION IN A MEDIUM WITH A DENSITY GRADIENT
E. I. Andriankin 20 Apr. 1965 9 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Otd. Tekhn. Nauk (Moscow), no. 2, 1958 p 123–125
(FTD-TT-64-1185/1; AD-615233)

Properties of the shock wave generated by a spot explosion in a medium with a density gradient were studied mathematically. It is assumed that the movement of the gas is adiabatic with a constant heat capacity ratio, that counterpressure is absent, and that the initial density in the explosion area can be considered constant. In particular, the case of axial symmetry is considered, and a system of partial differential equations describing the gas dynamics is solved to obtain closed expressions for the front of the shock wave. The equation of the front of the wave contains only that harmonic which goes into the distribution for the initial density. These results show that pressure and density are inversely related, and that the shock wave constitutes a sphere whose center emerges in the direction of decreasing density. Under certain conditions the variables in this problem are separable, which means that the results for the general case should be close to those for axial symmetry. J.M.D.

N65-28929# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Freiburg (West Germany). Institut für Angewandte Mathematik und Mechanik.
ON AN IMPROVED THEORY OF HEAT TRANSFER IN THE PRESENSE OF LARGE TEMPERATURE AND PRESSURE GRADIENTS IN MAIN FLOW DIRECTION [BEITRAG ZUR THEORIE DES WARMEUBERGANGS BEI STARKEN TEMPERATUR- UND DRUCKGRADIENTEN IN STROMUNGSRICHTUNG FUR EBENE UND ROTATIONSSYMMETRISCHE GRENZSCHICHTEN
A. Walz May 1965 57 p refs In GERMAN; ENGLISH and FRENCH summaries
(DVL-419; DLR-FB-65-21) Available from Zentralstelle für Luftfahrtdokumentation und Inform. (ZLDI), Munich: 15,20 DM

An approximation theory valid for compressible laminar and turbulent boundary layers is developed to account for temperature and pressure gradients which may vary arbitrarily along the wall. This theory is characterized by the introduction of a "modifying parameter" within the solution statement for the temperature profile. Thus, together with the momentum-loss thickness and the shape parameter of the velocity profile the theory contains three unknowns. These unknowns may be determined by solving the simultaneous system of three ordinary differential equations of first order (integral conditions of momentum and energy). Practicability and accuracy of this theory are checked by a number of sample calculations. Author

N65-28951*# Pratt and Whitney Aircraft, East Hartford, Conn.
DETERMINATION OF THE EMISSIVITY OF MATERIALS
Semiannual Progress Report, Nov. 15, 1964–May 14, 1965
W. Luoma and R. C. Emanuelson [1965] 56 p
(Contract NAS3-4174)
(NASA-CR-54444; PWA-2608) CFSTI: HC $3.00/MF $0.50 CSCL 20M

An emittance of 0.88 or better was obtained throughout 5300 hours testing with an iron titanate coating on AISI-310 stainless steel at 1350° F in a vacuum of about 2×10^{-8} mm Hg. A second iron titanate coating on niobium-1% zirconium gave an emittance of 0.85 or better at 1700° F for 6250 hrs. Also, a coating of calcium titanate on AISI-310 stainless steel was tested for 6300 hours at 1350° F with an emittance of about 0.90 throughout the tests. Emittance tests were also conducted at 1700° F on coatings of a stabilized titanium oxide composition, zirconium titanate, and barium titanate applied to niobium-1% zirconium tubes. The stabilized titanium oxide composition displayed an emittance of about 0.87 during 294 hours of testing. Both zirconium titanate and barium titanate were rejected for long-term endurance testing because both had emittance levels below 0.85 before the completion of short-term testing. An analysis conducted to determine the temperature drop across the wall of the tubes used for substrates indicated that the temperature drop would not exceed 0.5° F and therefore could be neglected. E.E.B.

N65-28953*# National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.
ANALYTICAL AND EXPERIMENTAL STUDY OF NUCLEAR HEATING OF LIQUID HYDROGEN
Bernhard H. Anderson and Ronald L. Danilowicz Washington, NASA, Jul. 1965 43 p refs
(NASA-TN-D-2934) CFSTI: HC $2.00/MF $0.50 CSCL 20M

During experiments which were performed in a tank positioned over a nuclear reactor. It was observed that a portion of the nuclear heating generated within the tank walls caused convective motion of the hydrogen, which formed a temperature gradient or stratified layer. An approximate analysis was developed to predict the local temperature rise in a subcooled fluid, subjected to wall heating and internal absorption of energy, and discharging at constant flow rate and pressure. Comparisons between experiment and analysis indicated that the analysis can predict the temperature histories with reasonable accuracy. A study was also made to determine the effects that the various analytical assumptions in the assumed flow model have on the calculated temperature history. Within the range of experimental test parameters, no appreciable error was introduced by considering the flow along the side walls to develop in a manner similar to the development of flow along a semi-infinite vertical flat plate. E.E.B.

N65-28984# Atomic Energy Establishment, Winfrith (England). Reactor Development Div.
A VISUAL STUDY OF FORCED CONVECTION BOILING. PART I: RESULTS FOR A FLAT VERTICAL HEATER
G. J. Kirby, R. Staniforth, and J. H. Kinneir Mar. 1965 31 p refs
(AEEW-R-281) HMSO: 4s 6d

This report presents the first results of a visual study of the hydrodynamics of boiling in channels and of burnout. It was found that the bubbles formed did not diffuse into the main stream at high heat fluxes, but remained close to the heater. Consequently severe coalescence took place, resulting in the formation of large regularly shaped bubbles. An analysis of the forces acting on these bubbles is given; this accounts qualitatively for the observed behaviour. The above bubble formations result from the addition of heat at a wall so that clearly isothermal models, such as those using air–water mixtures, cannot give a true representation of the flow pattern. Attempts to view the heater surface at burnout were frustrated by poor visibility through the boiling mixture. Author

N65-28987# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Freiburg (West Germany).
STANDING WAVES IN FREE CONVECTION FLOW BETWEEN VERTICAL WALLS OF DIFFERENT TEMPERATURE [UBER STEHENDE WELLEN IN EINER KONVEKTIONSSTROMUNG ZWISCHEN VERTIKALEN WANDEN VERSCHIEDENER TEMPERATUR]
H. Kappus and A. Lehman Mar. 1965 28 p refs In GERMAN; ENGLISH summary
(DLR-FB-65-15) Available from Zentralstelle für Luftfahrt Dokumentation und Inform. (Zldi), Munich: 7.10 DM

Standing waves of small amplitude in free convection flow of a viscous incompressible medium between vertical walls of different temperature are considered. The perturbation equations together with the appropriate boundary conditions constitute an ordinary eigenvalue problem of 12th order. A computer solution is obtained using an orthogonal expansion technique (Galerkin's method). The Grashof number as function of the wave number for the marginal state (neutral curve) and the values of some eigenfunctions are given. Author

N65-28998# Plasmadyne Corp., Santa Ana, Calif.
EVALUATION OF THERMAL PROTECTIVE SYSTEMS UNDER SIMULATED RE-ENTRY CONDITIONS
Shirley L. Grindle and James P. Todd Wright-Patterson AFB, Ohio, AF Mater. Lab., Feb. 1965 436 p
(Contract AF 33(657)-8476)
(ML-TDR-64-293; AD-616346)

Candidate materials for orbital and super-orbital re-entry vehicles were investigated, with prime emphasis on those materials applicable to the orbital re-entry vehicle. Other materials systems for application in leading edges, and various ASSET vehicle components were also investigated. The present performance limits of the hyperthermal plasma arc facilities available at Plasmadyne Corporation for materials evaluation have been established through an extensive series of calibration tests. Operating capabilities of heat flux, enthalpy and pressure have been defined for various nozzles. Author

N65-29022# Army Materials Research Agency, Watertown, Mass. Materials Engineering Div.
BLACKDOBY REFERENCE FOR TEMPERATURES ABOVE 1200 K; STUDY FOR DESIGN REQUIREMENTS
Albert F. Granis and Michael J. Matkovich Jan. 1965 24 p refs
(AMRA-TR-65-02; AD-614638)

Studies were made in the design of a temperature reference unit, incorporating a vacuum system with a sighting window, for temperatures ranging from 1200 K to 2100 K. In view of the many variables present, the design study was supplemented with analytical and experimental data. Included in this work were transmittance studies of different sighting windows for blackbody radiation, the study of thermal shielding, and experimental studies of blackbody radiation. The window materials available included fused silica, calcium fluoride, and sodium chloride. Recommendations are made in regard to structural materials, sighting windows, and thermal shielding. Author

N65-29045# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics

AN EXPERIMENTAL STUDY ON THE LIQUID LAYER INSTABILITIES OF AN ABLATING BODY

L. Bourely and R. W. Johnson Apr. 1965 21 p refs

(Contract Nonr-225(30))

(SUDAER-232; AD-615577)

The paper presents experimental evidence which shows that for pyrex and soda-lime glass, ring wave instability occurs at high stagnation pressure and temperature. It demonstrates that for a similar nylon model the ablation process is different. In light of the observations made during the test series, the importance of the parameters involved is discussed. Author

N65-29048# Instituto Nacional de Técnica Aeroespacial, Madrid (Spain).

SOME RESULTS IN SUPERSONIC COMBUSTION

Ignacio Da-Riva, Amable Liñán, and Enrique Fraga Paris, Intern. Council of the Aeron. Sci. [1964] 29 p refs Presented at the Intern. Council of the Aeron. Sci. 4th Congr., Paris, 24–28 Aug. 1964

(Grant AF-EOAR-63-43)

(AFOSR-64-2026; AD-451191) Available from Intern. Council of the Aeron. Sci.: 3 Fr.

Some basic aspects of supersonic combustion are discussed, concerning the use of airbreathing engines for the propulsion of space vehicles within the atmosphere. The advantages and drawbacks of using diffusion flames for supersonic combustion are discussed. An analysis of the supersonic turbulent mixing process is included. The influence on the flow field of the heat addition due to the diffusion flame is also analyzed. Finally, chemical kinetic non equilibrium effects with special emphasis on flame extinction are treated by considering, first, the laminar diffusion case and, afterwards, a tentative extension to the turbulent case. Author

N65-29085# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

COMPARING "BOILING LAYER" AND "DENSE LAYER" TYPES OF HEAT EXCHANGERS FOR THE UTILIZATION OF EXHAUST GAS HEAT

S. S. Zabrodskiy 13 Apr. 1965 20 p refs Transl. into ENGLISH from Tr. Inst. Energ. Akad. Nauk Belorusk. SSR (BSSR), no. 2, 1955 p 162–177

(FTD-TT-64-1109/1+2; AD-614948)

Boiling layer and dense layer heat exchangers are compared on the basis of thermal stress per unit of volume. In terms of thermal potential per unit of volume at identical resistances, an ideal homogeneous boiling layer is considerably more convenient than a dense layer, especially in the zone of fully developed boiling. For thermal processing of real polydispersion materials, the boiling layer again is more convenient than the dense layer, in view of the absence of the negative effect of thin fraction admixtures on the resistance of heat exchangers. R.N.A.

N65-29087# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

LIQUID SUSPENSIONS AS HEAT-TRANSFER AGENTS

V. I. Kofanov 13 Apr. 1965 12 p refs Transl. into ENGLISH from Energomashinostr. (Moscow), no. 1, 1964 p 41–43

(FTD-TT-64-1147/1+2; AD-614954)

An exposition is given of the dependences for the analysis of heat emission and hydraulic resistance of liquid suspensions in a turbulent flow in tubes as well as a comparison of the properties of liquid suspensions and liquid when they are used as heat-transfer agents. Author

N65-29103# Princeton Univ., N. J. Guggenheim Labs. for the Aerospace Propulsion Sciences.

SOLID PROPELLANT COMBUSTION MECHANISM STUDIES

Nineteenth Progress Report, 1 Jan.–31 Mar. 1965

Thomas J. Ohlemiller, Joseph Wenograd, and Martin Summerfield Jun. 1965 30 p refs

(Contract Nonr-1858(32); ARPA Order 23)

(Rept.-446-r; AD-466278)

In the combustion of composite solid rocket propellants based on ammonium perchlorate, the important rate determining processes have generally been presumed to occur within the gas phase flame. Recent results obtained in this laboratory suggest that condensed phase processes could also be important, particularly in low pressure combustion. The present research has been designed to study the nature of the processes involved in propellant gasification in the absence of the complicating effects of the gas phase flame. The experimental method being employed in this study permits the measurement of propellant regression rates in the absence of the gas phase flame. An intense radiant flux from an arc-image furnace is substituted for the conductive heat flux generally associated with the flame. The flame itself is eliminated by working at a vacuum below the propellant combustion limit. Preliminary tests on PBAA propellants subject to a radiant flux of 10 cal/cm^{2}sec have given burning rates of the order of 1/2 mm/sec with no evidence of a gas phase flame being present. Author

N65-29114# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THERMAL PROBES FOR MEASURING THE DENSITY OF HEAT FLOWS

V. M. Kiselev 12 Apr. 1965 4 p Transl. into ENGLISH from Soviet Patent No. 154690 (Appl. No. 785189/26-10, 4 Jul. 1962) 2 p

(FTD-TT-64-1115/1+2; AD-614949)

A thermal probe for measuring the density of heat fluxes contains a heat receptive surface and a sensitive element with thermocouples. The sensitive element is designed in the form of a ring with the circuit of thermocouples wound on it. For the purpose of measuring the degree of blackness of a radiating surface the heat-receptive surface is designed in the form of a hollow chamber. A limiter of the angle of vision is provided for changing the amount of the radiating surface. TAB

N65-29136*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

PREDICTION OF HEAT TRANSFER FROM LAMINAR BOUNDARY LAYERS, WITH EMPHASIS ON LARGE FREE-STREAM VELOCITY GRADIENTS AND HIGHLY COOLED WALLS

L. H. Back and A. B. Witte 1 Jun. 1965 23 p refs

(Contract NAS7-100)

(NASA-CR-63904; JPL-TR-32-728) CFSTI: HC $1.00/MF $0.50 CSCL 20M

Laminar boundary layer heat transfer and shear stress predictions from existing similarity solutions are extended in an approximate way to perfect gas flows with a large free-stream velocity gradient parameter $\bar{\beta}$ and variable density-viscosity product $\rho\mu$ across the boundary layer resulting from a highly cooled wall. The dimensionless enthalpy gradient at the wall g'_w, to which the heat flux is related, is found not to vary appreciably with $\bar{\beta}$. Thus, the application of similarity solutions on a local basis to predict heat transfer from accelerated flows to an arbitrary surface may be a reasonable approximation involving a minimum amount of calculation time. Unlike g'_w, the dimensionless velocity gradient at the wall f''_w, to which the shear stress is related, is strongly dependent on $\bar{\beta}$. Author

34 GENERAL

Includes reports of a broad nature related to industrial applications and technology, and to basic research; defense aspects; law and related legal matters; and legislative hearings and documents.

N65-27975# Joint Publications Research Service, Washington, D. C.
NEWS OF THE ACADEMY OF SCIENCES USSR, DEPARTMENT OF TECHNICAL SCIENCES, TECHNICAL CYBERNETICS, NO. 2, 1965
9 Jul. 1965 272 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Otd. Tekhn. Nauk: Kibernetika (Moscow), no. 2, Mar.–Apr. 1965 p 1–192
(JPRS-31002; TT-65-31500) CFSTI: $6.00

Papers are presented on theory and synthesis methods for cybernetic systems with various optimal features: automation, control, navigation, and information systems. For individual titles see N65-27976–N65-27999.

N65-28249*# Michigan State Univ., East Lansing.
NASA UNIVERSITY PROGRAM REVIEW CONFERENCE Summary Report, Mar. 1–3, 1965
Donald J. Montgomery Washington, NASA, 1965 42 p refs Conf. held at Kansas City, Mo., 1–3 Mar. 1965
(NASA-SP-81) CFSTI: HC $2.00/MF $0.50 CSCL 05A

The scope of NASA's university oriented activities are reviewed. The types of projects, facilities, relationship, technology utilization, and evaluation of the program are discussed. Digests of papers evaluating the NASA university research program are included. L.S.

N65-28284 Joint Publications Research Service, Washington, D. C.
DIMENSIONAL ANALYSIS OF BINARY FUSED SALT
Nien-i Ch'en and Kuang-Yun Li *In its* Transl. on Communist China's Sci. and Tech. 2 Jul. 1965 p 15–18 refs (See N65-28283 17-06) CFSTI: $2.00

Dimensional analysis is applied to binary fused salt solution and a summary of the relationship between its structure and its thermodynamic properties is presented. N.E.A.

N65-28332*# National Aeronautics and Space Administration, Washington, D. C.
THE NATURE AND SCOPE OF THE NASA UNIVERSITY PROGRAM
T. L. K. Smull 1965 41 p refs
(NASA-SP-73) GPO: HC $0.25; CFSTI: MF $0.50 CSCL 05I

In discussing the goals and achievements of the university program, the NASA predoctoral training program, the aggregate distributions of students by general fields, multidisciplinary research grants, research facilities, and step funding of research support are summarized. NASA's fiscal year 1964 obligations to universities are categorized; research support amounted to approximately $50 million, with some $42 million allocated to project-type research, and about $7 million used for specialized research under the Sustaining University Program. The responsibilities of NASA's three principal program offices are discussed, and the work of the Office of Grants and Research Contracts in coordinating these activities is described. M.G.J.

N65-28450# Advisory Group for Aeronautical Research and Development, Paris (France).
PROCEEDINGS OF THE FOURTEENTH AGARD GENERAL ASSEMBLY, 16–17 SEPTEMBER 1964 [PROCES-VERBAL DE LA QUATORZIEME ASSEMBLEE GENERALE DE L'AGARD, 16–17 SEPTEMBRE 1964]
[1964] 116 p refs Proc. of the Portuguese AGARD Conf., 14–22 Sep. 1964 In ENGLISH and FRENCH

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1. MAN-MACHINE SYNERGY T. C. D. Whiteside p 39–46 (See N65-28451 17-05)

2. ADAPTATION OF MAN TO THE MACHINE J. M. Quashnock p 47–63 (See N65-28452 17-05)

3. THE ROLE OF THE PILOT IN THE MERCURY AND X-15 FLIGHTS W. C. Williams p 65–81 refs (See N65-28453 17-05)

4. SOME ASPECTS OF HIGH-SPEED MANNED FLIGHT AT LOW ALTITUDES J. Ferguson p 83–89 (See N65-28454 17-05)

5. MAN–MACHINE PROBLEMS IN VTOL AIRCRAFT T. Benecke p 91–98 refs (See N65-28455 17-05)

6. 'CONCORDE': CONSIDERATION OF THE POINT OF VIEW OF THE RELATIONSHIP BETWEEN MAN AND MACHINE M. R. Blanchet p 99–118 (See N65-28456 17-05)

N65-28491# France. Ministere de l'Air, Paris.
CONTRIBUTION TO THE STUDY OF VARIABLE FLOW ACCOMPANYING THE ABRUPT DRAINAGE OF A DAM [CONTRIBUTION A L'ETUDE DE L'ECOULEMENT VARIABLE ACCOMPAGNANT LA VIDANGE BRUSQUE D'UNE RETENUE]
Yves Cavaille Ser. de Doc. et d'Inform. Tech. de l'Aeron., 1965 178 p refs In FRENCH *Its* Publ. Sci. et Tech. No. 410

Variable flow from a free surface is one of the great problems of hydraulics. The object of this present contribution is both a theoretical and experimental study of rapidly variable flow accompanying the sudden drainage of a dam in a horizontally prismatic canal with rectangular sections of varying roughness. Trans. by J.G.

N65-28870*# Washington Univ., St. Louis, Mo. Dept. of Economics.
AN EXPLORATORY ANALYSIS OF DEFENSE/SPACE COMPANIES
Murray L. Weidenbaum Jun. 1965 16 p refs *Its* Working Paper No. 6513
(Grant NsG-342)
(NASA-CR-63872) CFSTI: HC $1.00/MF $0.50 CSCL 05C

An examination of the impact of the Government's role in its relationships with the private economy are explored. Statistical data showing the extent to which 35 companies receiving the largest amounts of orders from the Department of Defense and NASA are dependent on such governmental contracts are used as a starting point, and questions of public policy are considered. Comparisons are made for six firms of roughly equal size which cater primarily to the private economy, and to six of the 35 aerospace companies, having corresponding sales. Significant and measurable differences are found in the basic characteristics of the two groups. Some of the differences are in the field of product development decisions, price determination, profit rates, provision of working capital, and research and development funds, source of plant and equipment, nature of the work force, and renumeration of top management. L.S.

N65-29091# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
GREATER BOUNDARIES OF SOVIET SCIENCE
V. Kirillin 14 Apr. 1965 9 p Transl. into ENGLISH from Izvestia (Moscow), 6 Nov. 1964 p 3
(FTD-TT-64-1327/1; AD-614967)

Soviet scientific developments are reviewed in general terms, and it is emphasized that contemporary scientific developments are closely related to practical applications and industry. Mathematical methods have been widely applied to the various scientific disciplines and industrial problems. Technical progress is discussed in relation to the development of new structural materials, polymers, abrasives, alloys, and semiconductors. The role of chemistry in creating new materials and in agricultural research is considered. M.W.R.

N65-29132# Naval Research Lab., Washington, D. C. Technical Information Div.
DIRECT ENERGY CONVERSION LITERATURE ABSTRACTS
Eileen Pickenpaugh comp. Dec. 1964 139 p refs *Its* Ser.-8 CFSTI: $2.75

Abstracts are presented on thermoelectricity, thermionic emission, photoelectric processes, magnetohydrodynamics, electrochemical processes, energy storage, and energy sources as these apply to the direct conversion of energy. E.E.B.

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Large pressure drop gas injector with additional jet nozzle for obtaining high vacuum
FTD-TT-65-1198/1+2 N65-29124 17-28
Annotated bibliography on cybernetics, automation, and telemechanics
FTD-MT-63-191 N65-29125 17-15
Ultrasonic device for detecting flaws in engine combustion chamber housings
FTD-TT-64-538/1 N65-29126 17-28
Quantitative data on heat resistance of binary nickel-chromium alloys - mechanism of oxidation, chemical composition dependence, and structural analysis
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Air flow structure in diffuser channels of multistage pump outlets
FTD-TT-64-711/1+2 N65-29128 17-12
Device for measurement of mass flow ratio with decreased energy requirement
FTD-TT-64-725/1+2 N65-29129 17-12
Theory of random functions to determine static characteristics of stresses and stress concentration coefficients for surface roughness of machine components during operation
FTD-TT-64-1080/1+2 N65-29130 17-15
Molecular genetics and radiation effects on heredity
FTD-TT-63-1214/1+2 N65-29131 17-04

AIR VEHICLE CORP., SAN DIEGO, CALIF.
Thin airfoil theory to derive wing section camber lines with wing section set at different angles of attack for use near ground
REPT.-349 N65-28802 17-32

AIRTRON, INC., MORRIS PLAINS, N. J.
Growth of broad linewidth ruby single crystals from flux and addition of gallium for high optical lasers
R-11-454 N65-28525 17-26

AIX-MARSEILLES UNIV. /FRANCE/.
Visually-evoked potentials in man recorded transcranially for normal patients and those suffering from cerebral diseases - central nervous system N65-28751 17-04

ALABAMA UNIV. RESEARCH INST., HUNTSVILLE.
Derivation of equations for heterogeneous continua substances consisting of distinct constituents
NASA-CR-63787 N65-28098 17-23

ALASKA UNIV., COLLEGE.
Observations and parameters of noctilucent clouds
UAG-P-162 N65-28242 17-13
Noctilucent cloud observations in tabular form - Northern and Southern hemisphere sightings
REPT.-3 N65-28810 17-13
Geophysics - bibliography of publications
N65-29019 17-13

ALLEGHENY LUDLUM STEEL CORP., BRACKENRIDGE, PA.
Tantalum alloy tubing development by heating and extrusion processes
RTD-TR-8-109 /V/ N65-28209 17-15

ALUMINUM CO. OF AMERICA, NEW KENSINGTON, PA.
Cathode protection of aluminum alloy under stress corrosive conditions in acid chloride solution - metallurgy
AD-615789 N65-29112 17-17

AMERICAN BOSCH ARMA CORP., GARDEN CITY, N. Y.
Manual space navigation computer to provide backup guidance capability under abort conditions during advanced manned space missions
NASA-CR-250 N65-28778 17-21

APPLIED PHYSICS LAB., JOHNS HOPKINS UNIV., SILVER SPRING, MD.
Information retrieval system for IBM 1401 and 7090 computers
APL-TG-669 N65-28148 17-08

ARGONNE NATIONAL LAB., ILL.
List processing techniques for automatic processing of 3-dimensional spark chamber data N65-28003 17-08
Computer program for calibrating flying spot cathode ray tube for CHLOE N65-28005 17-08
Computer programs for automatic analysis of chromosome photographs during mitosis N65-28006 17-08
Phenomenological approach to relativistic SU/6/ theory and quantization of field N65-28039 17-24

ARIZONA UNIV., TUCSON.
Interaction of static dynamic pressure loading, and cylindrical shell structures buried in soil
AD-610549 N65-28300 17-32

ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, N. H.
Closed form solutions to equations for spherical wave propagation in viscoelastic medium
CRREL-RR-158 N65-28528 17-32

ARMY CORPS OF ENGINEERS, CINCINNATI, OHIO.
Increasing flexural strength and shock resistance of concrete with random fibrous reinforcements
TR-2-40 N65-28604 17-18
Military aircraft characteristics - airfield pavement construction parameters
AD-455255 N65-29047 17-02

ARMY ELECTRONICS LABS., FORT MONMOUTH, N. J.
Maintaining ultrahigh vacuum to solve residual gas problem in microwave electronic devices
ECOM-2571 N65-28227 17-09
Modulator pulse and variable range-gate pulse circuit for lightweight combat surveillance radar systems
ECOM-2568 N65-28615 17-09
Application of high resolution nanosecond pulse techniques to combat surveillance radar - investigation of electronic switching devices
ECOM-2565 N65-28897 17-07

ARMY ENGINEER RESEARCH AND DEVELOPMENT LABS., FORT BELVOIR, VA.
Statistical probability to check accuracy of geodetic measurements

T-1764 N65-28165 17-13
Evaluation of 10-kw, 400-cycle gasoline-engine-driven generator set for radio terminal of Pershing missile system
REPT.-1801 N65-28918 17-11
Aerial photograph rectification - photostereograph
T-1766 N65-28997 17-14

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.
Static and compression moduli of soil in ground motions at high pressure levels
N65-28304 17-32
Shock wave attenuation in underground nuclear explosion N65-28309 17-32

ARMY MATERIALS RESEARCH AGENCY, WATERTOWN, MASS.
Nondestructive testing involving electromagnetic test methods - bibliography
AMRA-MS-65-03 N65-28197 17-15
Fracture mechanics - linear elasticity for strain energy rates for edge notches in tensile sheet
AMRA-TR-65-01 N65-28837 17-23
Penetrameter designs for all necessary radiographic quality levels - instrumentation
AMRA-MS-65-02 N65-28966 17-14
Transmittance studies of different sighting windows for black body radiation and design of temperature reference unit
AMRA-TR-65-02 N65-29022 17-33

ARMY MISSILE COMMAND, HUNTSVILLE, ALA.
Aerodynamic heating effects on external skin of Intercontinental Ballistic Missle /ICBM/ reentry test vehicle
RS-TR-65-3 N65-28742 17-33
Attitude determination system simulation with magnetometers and earth horizon sensor
RG-TR-65-11 N65-29104 17-14

ARMY SIGNAL RESEARCH AND DEVELOPMENT LAB., FORT MONMOUTH, N. J.
Radiation damage effect to P-channel metal oxide semiconductor /MOS/ field effect transistors /FET/
N65-29007 17-09

ARO, INC., ARNOLD AIR FORCE STATION, TENN.
Effective field of view of spectrometer with external collecting lens - light image reaching grating of spectrometer
AEDC-TR-65-125 N65-29101 17-14

ASTRO-SPACE LABS., INC., HUNTSVILLE, ALA.
Fabrication and test of laboratory model vortex-centered spinning sphere gyrocompass and hydrodynamic equations of motion
ASL-FE-65-21 N65-28153 17-14

ATOMIC ENERGY COMMISSION, OAK RIDGE, TENN.
Bibliography on bismuth tellurides, lead tellurides, and tin tellurides
TID-3583 N65-29058 17-26

ATOMIC ENERGY COMMISSION, WASHINGTON, D. C.
High energy accelerators - international conference
CONF-114, BOOK 1 N65-28812 17-11

High energy accelerators - international conference
CONF-114, BOOK 2 N65-28813 17-11

ATOMIC ENERGY ESTABLISHMENT, WINFRITH /ENGLAND/.
Fortran computer program using numerical quadrature to calculate Doppler broadened neutron cross sections
AEEW-M-518 N65-28834 17-24
Reactor physics calculations in Fortran language for IBM 7030 computer
AEEW-M-458 N65-28934 17-22
Simultaneous use of several pseudorandom binary sequences in identification of linear multivariable dynamic systems
AEEW-M-507 N65-28935 17-07
Visual study of forced convection boiling - flat vertical heater
AEEW-R-281 N65-28984 17-33

ATOMIC ENERGY INFORMATION SERVICE, FRANKFURT AM MAIN /WEST GERMANY/.
High energy physics - bibliography
AED-C-23-65 N65-28914 17-24

ATOMIC ENERGY OF CANADA, LTD., CHALK RIVER /ONTARIO/.
Conference on intense neutron flux generator
AECL-2177 N65-28575 17-24
Intense Neutron Generator /ING/ - c/st and use
N65-28576 17-24
Intense Neutron Generator /ING/ - spallation as basis for neutron generation N65-28577 17-24
High energy proton accelerator for intense neutron flux generation N65-28578 17-24
Intense Neutron Generator /ING/ - target design and target physics N65-28579 17-24
Intense Neutron Generator /ING/ as source of neutrons, protons, mesons, and neutrinos
N65-28580 17-24
Intense Neutron Generator /ING/ nuclear power implications N65-28581 17-24
Radio frequency system for Intense Neutron Generator /ING/ N65-28582 17-24
Intense Neutron Generator /ING/ engineering problems N65-28583 17-24
Intense Neutron Generator /ING/ shielding and activation N65-28584 17-24
Cold-worked zirconium - 2.5 weight percent niobium fuel sheathing for use in water-cooled reactors
AECL-2250 N65-28926 17-17

ATOMIC ENERGY OF CANADA, LTD., OTTAWA /ONTARIO/.
Design of radiation sterilization plants for medical supplies and pharmaceuticals
AECL-2264 N65-28023 17-04
Nuclide production in Intense Neutron Generator /ING/ N65-28585 17-24

ATOMIC WEAPONS RESEARCH ESTABLISHMENT, ALDERMASTON /ENGLAND/.
Atomic weapons research - evaluation of neutron cross sections
AWRE-O-13/65 N65-28836 17-24
Chelation with alkaline earth metals, chelate compounds in radioelement removal therapy, and search for strontium 90 and plutonium 239 removal agents
AWRE-O-4/65 N65-28883 17-04
Thermobalance for use in thermogravimetry involving radioactive materials
AWRE-O-14/65 N65-28884 17-14
Determination of particle size distribution of particulate material during operation Roller Coaster including performance of cascade impactors and fitting of distributions
AWRE-O-20/65 N65-28885 17-04
IBM computer method for group average neutron cross sections
AWRE-O-97/64 N65-29043 17-24

ATOMICS INTERNATIONAL, CANOGA PARK, CALIF.
Viewing device and special attachments designed and developed for core viewing and photography at sodium reactor experiment site
NAA-SR-10606 N65-28129 17-22
Spectrum normalization scheme for radiation damage in silicon
NAA-SR-10612 N65-28221 17-99
Curie-Dose-Thunderhead - digital computer program for calculation of internal and external radiation doses
NAA-SR-8884 N65-28693 17-24
Electrolysis of uranium carbide in fused salt molten metal cathodes - laboratory method for reprocessing uranium carbide from nuclear power reactor
NAA-SR-10737 N65-28820 17-06
Effects of neutron irradiation on liquid sodium dilation of graphite - bulk expansion and X-ray diffraction data resulting from graphite dilatometry experiments
NAA-SR-11309 N65-28858 17-22
Electron-electron and electron-photon interactions in thin films - superconducting nuclear particle detector
AI-65-108 N65-28922 18-14
Structural design for large sodium graphite reactor with calandria core - cutting and welding equipment developed for processing welded joint
NAA-SR-9821 N65-29017 17-22

AUTONETICS, ANAHEIM, CALIF.
Air-to-ground visual target recognition - program description
T5-132/3111 N65-28792 17-07

AVCO CORP., WILMINGTON, MASS.

Air or vacuum heating high temperature furnace for horizontal diffractometer
R400-65-196 N65-28183 17-11

B

BALDWIN-LIMA-HAMILTON CORP., WALTHAM, MASS.
Data reduction methods for semiconductor strain gauges N65-28139 17-14
BATTELLE MEMORIAL INST., COLUMBUS, OHIO.
Small scale operation of transducer information center
AFFDL-TR-65-30 N65-28370 17-14
Radiation effect on System for Nuclear Auxiliary Power /SNAP/ program electrical equipment
BMI-X-10120 N65-28711 17-22
Evaluating mechanical properties of metals - Fracture testing, exposure and stress corrosion, creep testing, strain rate, and effects of vacuum on metals N65-28932 17-17
Recent developments in niobium, tantalum, and molybdenum alloy technology N65-28981 17-17
Effect of coating thickness, coating density, fuel particle density, and fuel particle diameter on behavior of aluminium oxide and uranium oxide during irradiation
BMI-1729 N65-28985 17-22
BATTELLE-NORTHWEST, RICHLAND, WASH.
Development of gamma monitors for aerial and ground survey of radiation
BNWL-62 N65-28022 17-14
Costs of reactor fuels using light water moderated reactors and central plant reprocessing refabrication
BNWL-28 N65-28138 17-22
Radiation hazards in handling high exposure plutonium used in fabrication of fuel elements
BNWL-27 N65-28216 17-22
Beta-alpha and alpha-beta transformations in plutonium under applied stress
BNWL-33 N65-28217 17-17
Boronated graphite irradiation to determine strength, dimensional stability, and effect of boronation on radiation damage in Hanford reactor
BNWL-96 N65-28218 17-22
Physical metallurgy, reactor metals, chemical metallurgy, and material engineering
BNWL-79 N65-28244 17-22
Fission product relocation occuring during high temperature irradiation of uranium oxide fuel elements
BNWL-58 N65-28733 17-22
Nuclear reactor ceramic materials and fuel elements studies
BNWL-91 N65-28831 17-22
BAUSCH AND LOMB, INC., ROCHESTER, N. Y.
Nature and amount of defect structures of fluorides and monoxides characterized by density, refractive index, and X-ray determined lattice parameters
AD-615609 N65-28657 17-26
BAYLOR UNIV., HOUSTON, TEX.
Data processing of EEG and multiple peripheral psychophysiological measurements with special purpose analog-to-digital conversion unit N65-28759 17-04
Information processing technology for clinical investigations applied to effect of bed rest and exercise on cardiovascular responses N65-28763 17-04
Data acquisition and automatic data processing system for normative electroencephalographic reference tape library N65-28768 17-04
Computer design for analyzing effects of bed rest on cardiac dynamics and discussion of orthostatic hypotension N65-28769 17-04
BELGRADE UNIV. /YUGOSLAVIA/.
Effect of active impurities on silver bromide microcrystals to synthesize ultrafine ionographic high sensitivity nuclear emulsion properties N65-28385 17-24
BENDIX CORP., SOUTH BEND, IND.
Improvement of atmospheric contamination resistance and high temperature strength of ductile chromium composite material
AD-465787 N65-28602 17-17
BERGEN UNIV. /NORWAY/.
Statistical analysis of meteorological variables
AFCRL-65-326 N65-28603 17-20
BETTIS ATOMIC POWER LAB., PITTSBURGH, PA.
Test of pressurized water reactor core control rod to determine effect of irradiation on properties of hafnium and consequences of abnormal corrosion of zircaloy 2-hafnium weld joints
WAPD-TM-457 N65-29015 17-22
BOEING CO., RENTON, WASH.
Development of power-spectral gust design procedure for civil aircraft
D6-2575, VOL. I N65-28127 17-02
Orthogonal detection of radar targets in rain at K-band
D6-16136 N65-28534 17-07
BOEING CO., SEATTLE, WASH.
Unbiased nonparametric test to determine if sample comes from population with increasing failure rate - distribution under null hypothesis
D1-82-0422 N65-27974 17-19
Flux and energy spectra of cosmic ray neutrons produced within atmosphere by primary cosmic radiation - measurements from South American sites during January and February, 1964
D1-82-0417 N65-28974 17-29
BOEING SCIENTIFIC RESEARCH LABS., SEATTLE, WASH.
Application of differential inequalities for error approximation method for partial differential equations with emphasis on nonlinear problems
D1-82-0431 N65-28143 17-19
Functional analysis and general theory of relation between vibrating system and linear operator
D1-82-0407 N65-28215 17-23
Superlinear convergence of Newton method without twice differentiability or Lipshitz continuity of first derivative of operator
D1-82-0426 N65-28355 17-23
Paths in polyhedra and polytopes related to linear programming - mathematics
D1-82-0362 N65-28712 17-19
Plasma phenomena in solids and gases - plasma physics
D1-82-0419 N65-29000 17-25
BOLT, BERANEK, AND NEWMAN, INC., CAMBRIDGE, MASS.
Propagation of sound through atmospheric boundary layer and techniques for applying meteorological corrections to sound ranging data
BBN-1235 N65-28574 17-20
BRIGHAM YOUNG UNIV., PROVO, UTAH.
Resistance in silver wires after quenching from high temperatures and diffusion of silver into lead using radioactive tracer techniques
AFOSR-65-0580 N65-28675 17-17
BROOKHAVEN NATIONAL LAB., UPTON, N. Y.
Hough-Powell digitizer system for rapid processing of bubble chamber photographs N65-28009 17-08
Digital automatic scanning programs for data handling system N65-28020 17-08
High energy elastic scattering, charge exchange scattering, and polarization experiments N65-28037 17-24
Optical model analysis of elastic and inelastic neutron scattering cross sections in aluminum at high energy
BNL-927/T-383/ N65-28977 17-24
Nuclear spin, moments, and orientation - polarized nuclei and neutron beam experiments
BNL-903/T-389/ N65-28978 17-24
BROWN ENGINEERING CO., INC., HUNTSVILLE, ALA.
Parametric study of variation in trajectory parameters for predetermined thrust orientation angle to perform lunar descent from parking orbit
NASA-CR-61075 N65-28000 17-30
BROWN UNIV., PROVIDENCE, R. I.
Gas dynamics with nonequilibrium radiative and collisional ionization in flows
NONR-562/35//8 N65-28229 17-12
BRUSSELS UNIV. /BELGIUM/.
Large scale perturbations in middle and higher stratosphere N65-28517 17-13
BUNDESAMT FUER WEHRTECHNIK UND BESCHAFFUNG, KOBLENZ /WEST GERMANY/.
Man-machine problems in VTOL aircraft - technological aspects N65-28455 17-05

BUREAU D ANALYSE ET DE RECHERCHE APPLIQUEES, ISSY-LES-MOULINEAUX /FRANCE/.
Analog design of supercavitating hydrofoil at nonzero cavitation number near free surface N65-28514 17-12

BUREAU OF MINES, ALBANY, OREG.
Chlorination kinetics of niobium, germanium, iron, molybdenum, silicon, tantalum, and tungsten to determine effects of heat, geometric surface area, gamma radiation, and Cl amounts
BM-RI-6649 N65-28811 17-06

BUREAU OF MINES, BARTLESVILLE, OKLA.
Far infrared spectra of organic compounds in 15-200 micron region
BM-RI-6630 N65-28595 17-06
Thermochemistry of boron and boron compounds - enthalpy of formation of boron compounds N65-28973 17-06

BUREAU OF MINES, PITTSBURGH, PA.
Fire and explosion hazards from massive spill of nonhypergolic fuel and oxidizer of missile propulsion system - precautions
AFAPL-TR-65-28 N65-28684 17-33
Dust explosions of elemental metals, alloys, catalysts, and ores
BM-RI-6516 N65-29133 17-17

BUREAU OF MINES, RENO, NEV.
Solubility, thermal expansion, electric resistivity, and mechanical properties of vanadium-carbon alloys
RI-6628 N65-28125 17-17

BUREAU OF SOCIAL SCIENCE RESEARCH, INC., WASHINGTON, D. C.
Concepts and indicators in studies of behavior under stress - logic
AD-610808 N65-28803 17-04

BURROUGHS CORP., PAOLI, PA.
Radar video data processor design, fabrication, and testing
SRDS-RD-64-128 N65-28912 17-08

C

CALIFORNIA INST. OF TECH., PASADENA.
High energy strong interaction symmetries and self-consistent currents in bootstrap theory - heuristic approach N65-28031 17-24
Noncompact groups related to symmetry in high energy interactions - theoretical physics N65-28034 17-24
Time reversal violation in weak interactions with two U/8/ subgroups of U/12/ symmetries - group theory N65-28040 17-24
Symmetry approach to particle physics - review of transformation properties, mixed symmetries and extensions, and bootstrap philosophy in high energy interactions N65-28043 17-24
General formulation of perturbation theory for unsteady two-dimensional cavity flows in gravity free field
REPT.-E-97.7 N65-28535 17-12

CALIFORNIA UNIV., BERKELEY.
Multiparticle resonance decay in high energy interactions - theoretical physics N65-28028 17-24
Wave equations for rectangular waveguide filled with anisotropic dielectric solvable by methods of linear algebra
REPT.-64-34 N65-28549 17-09
Hemodynamic evaluation of primates before, during, and after long periods of weightlessness in earth-orbiting satellite N65-28758 17-04
Saponifiable and nonsaponifiable soxlet and cold solvent extracts of soil, carbonaceous meteorite, and sedimentary rocks studied by thin layer chromatography and spectroscopy
NASA-CR-63876 N65-28873 17-13

CALIFORNIA UNIV., BERKELEY. LAWRENCE RADIATION LAB.
Data tables and graphs on particles and resonant states - mesons, leptons, pions, and baryons
UCRL-8030, PT. 1 N65-28126 17-24
Mathematical analysis for optimal use of multiple scattering data for determining scattering rigidity of particles in nuclear emulsions N65-28417 17-24
Range difference between positive and negative pions in nuclear emulsion
UCRL-11518 N65-28423 17-24
Monte Carlo method for artificially generating grain coordinates of particle tracks in nuclear emulsion
UCRL-11624 N65-28429 17-24
Emulsion experiments on polar orbiting satellites for study of geomagnetically trapped protons N65-28436 17-24
Thermodynamic equilibria of glass-metal systems
UCRL-11816, REV. N65-28893 17-15
Gas and surface kinetics of atomic hydrogen at low pressures
UCRL-16050 N65-28911 17-24

CALIFORNIA UNIV., LIVERMORE. LAWRENCE RADIATION LAB.
Physics progress report - nuclear and atomic physics, thermodynamics, fluid mechanics, hydrodynamics, and radiation physics
UCRL-12204 N65-28718 17-23
Ballistic ejection of earth by underground explosions - Sedan project
PNE-218F N65-28819 17-13
Wigner analysis of unitary representations of inhomogeneous Lorentz group
UCRL-12359 N65-28859 17-23
Aggregate production with underground nuclear explosions in hard rock
UCRL-12180, REV. 2 N65-28894 17-22
Low density and low pressure solid explosive - detonable system based on low concentrations of crystalline pentaerythritol tetranitrate /PETN/
UCRL-14186 N65-28962 17-06
Trajectory of charged particle in axially symmetrical electromagnetic field including self-fields and external focusing elements
UCRL-14194 N65-28962 17-25
Pion-proton partial inelastic cross section data
UCRL-14202 N65-28963 17-24

CALIFORNIA UNIV., LOS ANGELES.
Mood, motility, and 17-hydroxycorticoid excretion in cyclic manic-depressive patient
NASA-CR-63785 N65-28697 17-04
Aerosonics bibliography - fluid dynamics of supersonic jet flows
REPT.-65-3 N65-28720 17-12
Hilbert space methods in elliptic partial differential equations
AD-466892 N65-28741 17-19
Concepts of cerebral organization arising from time series analysis of neurophysiological data related to problems of EEG wave process origin N65-28756 17-04
Systems design for neurophysiological data acquisition in context of on-line digital computer programming N65-28762 17-04
Parameters for computer analysis of neurophysiological data using EEG from normative library N65-28766 17-04
Biosatellite performance simulations related to changes in primate central nervous system and cardiovascular system performance in space N65-28771 17-04
Cerebral, cardiovascular, and behavioral performance of monkey in space - biosatellite program N65-28772 17-04

CARBORUNDUM CO., NIAGARA FALLS, N. Y.
Refractory materials for missile propulsion systems - refining fabrication techniques for obtaining porous carbide matrices
QPR-6 N65-28685 17-18

CENTRAL TECHNICAL INST., TNO, THE HAGUE /NETHERLANDS/.
Burnout heat flux of polyphenyl reactor cooling agents
EUR-2299.E N65-28890 17-33

CENTRE DE RECHERCHES NUCLEAIRES, STRASBOURG /FRANCE/.
Recording of alpha particle traces studied by various nitrocellulose materials N65-28376 17-24
Detecting traces of alpha particles in irradiated monocrystals and use with silver chloride crystals N65-28379 17-24
Effect of second exposure of long duration and low intensity in reinforcing latent images N65-28384 17-24
Microscope and oscilloscope assembly for measuring nuclear particle trace width in emulsion layers N65-28411 17-14
Electron microscope to observe nuclear particle

traces in ionographic emulsions
N65-28421 17-14

CENTRE NATIONAL D ETUDES SPATIALES, PARIS /FRANCE/.
Sources of electric power for space mission
P-700 N65-28478 17-03
Photovoltaic conversion of solar energy for space missions
P-701 N65-28479 17-03
Conversion of chemical energy into electric energy - chemical battery evaluation
P-702 N65-28480 17-03
Conversion of thermal energy into electrical energy
P-811 N65-28481 17-03
Progress review of developments in thermionic conversion
P-824 N65-28482 17-03
Principles and developmental techniques in thermoelectric conversion
P-825 N65-28483 17-03
Measuring apparatus and fabrication of reference for light reflection
CNES-NT-2 N65-28516 17-33

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, PARIS /FRANCE/.
Wake produced by mesh network moving through rarefied atmosphere at low speed
REPT.-65-3 N65-28511 17-13
Differential equation text - discussion of surface motion trajectory and linear equation
N65-28518 17-19

CHICAGO UNIV., ILL.
Dynamical symmetries and fundamental triplets with extreme nonrelativistic model of baryons - high energy interactions N65-28036 17-24
Theoretical investigation of gaseous nebulae evolution of hydrogen II regions of stars - stellar evolution
AD-614715 N65-28185 17-30

CLIMAX MOLYBDENUM CO. OF MICHIGAN, ANN ARBOR.
Lowering transition temperature of arc-cast molybdenum to improve purity and ductility
AD-615544 N65-28232 17-15

COLLEGE DE FRANCE, PARIS.
Flow graphs of results obtained with off-line CERN Hough-Powell digitizer data reduction system N65-28016 17-08
Control of Hough-Powell digitizer by small computer N65-28017 17-08

COLORADO SCHOOL OF MINES RESEARCH FOUNDATION, INC., GOLDEN.
Production of oxygen from silicates in ultrahigh vacuum
AFOSR-65-0739 N65-28203 17-06

COLUMBIA UNIV., DOBBS FERRY, N. Y.
Vortex lines in fluid flow stretched by shear flow and resulting equations for small disturbances, motion in absence of stretching, long time behavior, and pressure
CU-141-65-ONR-266-PHYS. N65-28184 17-12

COLUMBIA UNIV., NEW YORK.
Radiological physics, biophysics, and radiobiology
NYO-2740-2 N65-28021 17-04
Stress and deflection diagrams for airfield two-layer pavement systems - effectiveness of layered system reinforcing action
TR-1 N65-28193 17-32
Viscoelastic behavior of potassium chloride aluminum powder solid propellant in reversed torsion
TR-27 N65-28740 17-27
Correlation of electron and optical microscopic observations of torsional fatigue in brass
TR-19 N65-28784 17-17

COMMISSARIAT A L ENERGIE ATOMIQUE, FONTENAY-AUX-ROSES /FRANCE/.
Chemical method for determining number of fission particle traces in material irradiation by slow neutrons N65-28378 17-24
Flow of dense plasma puff along axis of uniform magnetic field
CEA-R-2617 N65-28489 17-25

COMMISSARIAT A L ENERGIE ATOMIQUE, SACLAY /FRANCE/.
Lagrangian expression for multifluid system in electromagnetic interaction
CEA-R-2608 N65-28488 17-25

COMPAGNIE GENERALE DE TELEGRAPHIE SANS FIL, PUTEAUX /FRANCE/.
Structure and activities of oxygen-hydrogen gas electrodes to improve performance and reduce costs by modified geometric structure and less expensive catalysts N65-28512 17-09

CONSOLIDATED CONTROLS CORP., BETHEL, CONN.
Pressure transducer system with thermionic diode sensor for closed cycle liquid metal application
NASA-CR-54439 N65-28807 17-14

CORNELL AERONAUTICAL LAB., INC., BUFFALO, N. Y.
Laminar boundary layer separation on moving wall and swirl pattern effect on rotating cylinder - development of flow instability sensor for rotating stall in axial flow compressor
CAL-DF-1901-S-2 N65-28336 17-12

CORNELL UNIV., ITHACA, N. Y.
Effect of electron-phonon interaction on temperature dependent amplitude of De Haas-Van Alphen oscillations
TR-6 N65-28359 17-26

CORNELL-DUBILIER ELECTRONICS DIV., FEDERAL PACIFIC ELECTRIC CO., NORWOOD, MASS.
Capability to manufacture silicon monoxide microelement capacitors by mass production techniques
QR-7 N65-28199 17-15

CZECHOSLOVAK ACADEMY OF SCIENCES, PRAGUE.
Film dosimetry with additions in developer to inhibit reduction process N65-28438 17-24
Reflex skin potential reactions in man under various physiological conditions
N65-29032 17-04

D

DAYTON UNIV., OHIO.
Received signal scintillation at optical, radio and microwave frequencies
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DENVER RESEARCH INST., COLO.
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Polarization and elastic scattering of protons and neutrons from nuclides - bibliography
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Pulsed neutron analysis in Kiwi B-4 reactor core
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Atmospheric ozone - concentration, distribution, detection, and relationship with meteorological phenomena - bibliography
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LOUVAIN UNIV. /BELGIUM/.
Ions produced in chemically reacting systems by gaseous conductimetry and ionization reaction
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Electron probe, X-ray fluorescence spectroscopy, and spectrochemical analyses and electrolytic preparation of uranium metal from uranium dioxide
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Vapor phase deposition of boron on titanium by reaction between gaseous boron trichloride and titanium metal
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Computer program for orbiting three body system simulation in Fortran
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MARTIN CO., DENVER, COLO.
Effect of load area on deformation of clamped spherical cap and behavior of transition from axisymmetric to asymmetric deflection shapes
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MASSACHUSETTS GENERAL HOSPITAL, BOSTON.
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MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
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MATHEMATICAL SCIENCES CORP., SEATTLE, WASH.
Photoelastic stress measurements in solid propellant grains
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MAX-PLANCK-INSTITUT FUR PHYSIK UND ASTROPHYSIK, MUNICH /WEST GERMANY/.
Increasing accuracy of tracks reconstructed by THRESH from HAZE output N65-28012 17-08
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Mechanical analog computer for measuring ranges and angles of particle tracks in nuclear emulsions N65-28414 17-14
Gas targets and nuclear emulsions for scattering experiments N65-28436 17-24

MCGILL UNIV., MONTREAL /QUEBEC/.
Structure and statistics of logarithmic series distribution
ARL-64-197 N65-28161 17-19

MELLON INST., PITTSBURGH, PA.
Nuclear magnetic resonance - chronological bibliography
AFOSR-65-0579 N65-28838 17-06

MELPAR, INC., FALLS CHURCH, VA.
Equations of motion for helicopters and V/STOL aircraft for simulation using analog or digital computer
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MIAMI UNIV., CORAL GABLES, FLA.
Symmetry in high energy interactions
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MICHIGAN STATE UNIV., EAST LANSING.
NASA University Program review - conference
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MICHIGAN TECHNOLOGICAL UNIV., HOUGHTON.
Behavior of crystalline defects in semiconductor materials - diffusion in germanium during straining, crystal growth and preparation, stress plastics and tensile properties
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MICROWAVE ELECTRONICS CORP., PALO ALTO, CALIF.
Low noise traveling wave tubes for K-bands
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MIDWEST RESEARCH INST., KANSAS CITY, MO.
Cylindrical shell flutter model, supporting instrumentation, and thin shell electroforming facility for fabricating flutter shells
AFOSR-65-0247 N65-28719 17-32

MINISTRY OF DEFENCE, CHRISTCHURCH /ENGLAND/.
Pressure loading on buried circular and square tubes N65-28313 17-32

MINNESOTA UNIV., MINNEAPOLIS.
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MONSANTO RESEARCH CORP., EVERETT, MASS.
Storable rocket propellant fuel cells - nitrogen tetraoxide and unsymmetrical dimethyl hydrazine decomposition
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MOUND LAB., MIAMISBURG, OHIO.
Phase diagrams, physical properties, and thermal properties of nuclear reactor fuels and materials and plutonium ceramic fuel elements
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NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
United States space science reports - condensed compilation N65-28716 17-30

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION.
AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Wind tunnel tests - effect of wind induced loads on dynamically scaled model of large missile in launching position
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Charts for equilibrium and frozen flow across plane shock waves in carbon dioxide used in estimating aerodynamic performance characteristics of bodies in flight
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION.
GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
Nuclear emulsion measurements on particle populations in space using sounding rockets and Gemini spacecraft N65-28434 17-24
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Recording telemetry signals from scientific satellites - signal to noise ratio in magnetic recording
NASA-TN-D-2952 N65-28952 17-07
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.
Method for predicting sound focusing with wind conditions for Saturn launch
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, LANGLEY STATION, VA.
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NATIONAL BUREAU OF STANDARDS, WASHINGTON, D. C.
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NATIONAL CANNERS ASSOCIATION, WASHINGTON, D. C.
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NATIONAL ENGINEERING SCIENCE CO., PASADENA, CALIF.
Beam deflection by anomalous dispersion techniques for laser scanner application
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NATIONAL INST. OF NEUROLOGICAL DISEASES AND BLINDNESS, BETHESDA, MD.
Human-aided computer linguistic method for analysis of morphological data
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NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA /ONTARIO/.
Experiments on perception of ultralow frequency waves by birds
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NATIONAL UNIV. OF IRELAND, DUBLIN.
Solution of boundary value problems for thin elastic plates and shells
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NATIONAL WEATHER SATELLITE CENTER, WASHINGTON, D. C.
Catalog of Tiros VII and VIII cloud photography for October, November and December 1964
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NAVAL AMMUNITION DEPOT, CRANE, IND.
Life cycle tests on nickel-cadmium, silver-cadmium, and silver-zinc battery power supply cells for aerospace applications
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NAVAL ORDNANCE LAB., WHITE OAK, MD.
IBM 7090 computer program for designing contoured axisymmetric nozzles for high temperature air - Fortran program
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NAVAL ORDNANCE TEST STATION, CHINA LAKE, CALIF.
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NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
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NAVAL PROPELLANT PLANT, INDIAN HEAD, MD.
Barrel bed drying, rotolouvre, and dielectric drying studies using casting powder - propellant manufacturing
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NAVAL RESEARCH LAB., WASHINGTON, D. C.
Comparison of underwater attenuation of ruby laser light with nonlaser light
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Evaluation of antimotion sickness drugs in slow motion room mounted on human centrifuge
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Sensory rearrangement and vestibular habituation in humans subjected to continuous rotation
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NAVAL WEAPONS LAB., DAHLGREN, VA.
Rawinsonde measurements to determine if density and wind correlate with total ballistic densities and winds at any altitude or pressure level
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NAVY ELECTRONICS LAB., SAN DIEGO, CALIF.
Modification of third-octave digital analyzer - redesign and replacement digital equipment
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NEW MEXICO STATE UNIV., UNIVERSITY PARK.
Effect of optical pumping on anomalous dispersion in selected ruby lasers and variation of refractive index during laser operation
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Static pressure loading on buried cylinders measured by strain gauge N65-28318 17-32
Parameters for computer analysis of neurophysiological data using EEG from normative library N65-28766 17-04
NEW YORK UNIV., N. Y.
High frequency scattering of scalar plane wave by impenetrable reflecting sphere - analysis using modified Watson transformation
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Mechanism for encoding, processing and storage of perceptual conformation in problem solving
AD-463786 N65-28999 17-05
NEWMARK, HANSEN AND ASSOCIATES, URBANA, ILL.
Underground shelter for protection against megaton size nuclear weapons for use by troops in forward battle areas
REPT.-1-110 N65-28783 17-32
NIHON UNIV., TOKYO /JAPAN/.
Deformable sphere model of elementary particles and origin of internal symmetries
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NIKFI INST., MOSCOW /USSR/.
Increase in photosensitivity during storage of emulsion layers capable of recording minimum ionization particles under low humidity and high temperature conditions N65-28383 17-24
Photographic developer for nuclear emulsion irradiated with electrons - charged particle N65-28402 17-24
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NORD-AVIATION, PARIS /FRANCE/.
Calculations of unducted propeller operations - computer program application
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NORTH CAROLINA STATE COLL., RALEIGH.
Radiation and gravitational effect on wasps and shrimp - animal study
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NORTHWESTERN UNIV., EVANSTON, ILL.
Sigma hypothesis in meson decays - theoretical physics N65-28033 17-24
Dynamic pressure transmission in soil structural foundation under vibratory loading N65-28321 17-32
Evaluation from X-ray diffraction profiles of Fourier coefficients and microstrain distribution function
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NOTRE DAME UNIV., IND.
Soil strength under dynamic loading by pneumatic system N65-28307 17-32

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OAK RIDGE NATIONAL LAB., TENN.
Gas and steam turbine power plant comparison for use with ceramic gas cooled reactors
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Fortran-63 computer program for determination of radioisotopes by least squares method of resolution of gamma ray spectra
ORNL-3810 N65-28132 17-06
Oxygen effects on corrosion of niobium by liquid potassium
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ORNL-3655 N65-28925 17-19
Gravitational field of static magnetic universe with orbital force lines
ORNL-3827 N65-28980 17-13
OAK RIDGE OPERATIONS OFFICE, TENN.
Safety procedures for operation of experimental gas cooled reactor
ORO-606/SUPPL. 1/ N65-28789 17-22
OCEANICS, INC., PLAINVIEW, N. Y.
Water tunnel measurement of dynamic velocity fluctuations in air wake of carrier encountered by landing aircraft
REPT.-65-21, PT. 1 N65-28650 17-12
OHIO STATE UNIV. RESEARCH FOUNDATION, COLUMBUS.
Steady state nuclear magnetic resonance measurements on solid mixtures of ortho hydrogen-ortho deuterium using marginal oscillator technique
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OHIO STATE UNIV., COLUMBUS.
Astronomical theodolite for providing precise astronomic latitudes and longitudes - celestial geodesy
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OHIO UNIV., ATHENS.
Mathematical models of null reference and capture effect glide paths in presence of snow covered and irregular ground planes
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OKLAHOMA CITY UNIV., OKLA.
Effects of discontinuous exposure to high oxygen low pressure environment on rats - aerospace medicine
NASA-CR-63790 N65-28346 17-04
OKLAHOMA UNIV., NORMAN.
Correlation of experimental and theoretical results of gas flow through capillary orifice model
AD-614671 N65-28919 17-12
OLIN MATHIESON CHEMICAL CORP., NEW HAVEN, CONN.
Complexes of bis-phosphino derivatives of o-carboranes with nickel chloride and other metal chlorides
TR-25 N65-28169 17-06
OSMANIA UNIV., HYDERABAD /INDIA/.
Nuclear scattering measurements in photographic emulsions N65-28409 17-24
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PACIFIC MISSILE RANGE, POINT MUGU, CALIF.
Low cost plastic foam molds for laminated plastics
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PARAMETRICS, INC., WALTHAM, MASS.
Ionizing radiation techniques for measuring free stream air density aboard reentry vehicles
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PARMA UNIV. /ITALY/.
Fallout detection using nuclear emulsions N65-28440 17-24
PAYNE /PETER R./, INC., ROCKVILLE, MD.
Equation for curvilinear jet flow - diffusion theory
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Equation for curvilinear jet flow - diffusion theory

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Equilibrium compositions, diffusion couples, impurity effects, and deterioration of refractory metals - molybdenum, niobium, tantalum, and tungsten
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PEK LABS., INC., SUNNYVALE, CALIF.
Measuring absorption coefficient of gas carrying discharged currents typical of flash lamps
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PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Intersections of initial and subsequent yield surfaces with hydrostatic principal stress plane - triaxial stress experiment
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Solar ionizing flux from sunrise measurements of electron content
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Solar radio flux density data - Ionospheric research
SR-241D N65-28596 17-29
Determination of D-region electron collision frequency profiles from phase and amplitude wave interaction measurements
SR-238 N65-28597 17-29
Solar radio flux data - January-March, 1965
SR-243D N65-29041 17-28
Shock analysis of structural networks - effect of concentrated mass position on components and systems response
AD-431915 N65-29049 17-32
PENNSYLVANIA UNIV., PHILADELPHIA.
Hough-Powell digitizer programming using IBM 7040 computer - Photographic measurement of bubble chamber and spark chamber data
N65-28019 17-08
Microyielding and macroyielding of zone refined polycrystalline iron at low temperatures
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Nonthermal effects of alternating electrical fields on biological structure
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PERKIN-ELMER CORP., NORWALK, CONN.
Optical technology experiments for satellite - communications, acquisition, tracking, lasers, photometry, and atmospherics
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PHILCO CORP., BLUE BELL, PA.
Analytical expressions for means and variances of normally distributed components of far field for spherical array and computer programs for generating far field patterns for thinned arrays
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PHILCO CORP., LANSDALE, PA.
Fabrication of high-capacitance voltage-variable capacitance 200 volt planar silicon diodes for electronic tuning
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PHILIPPS-UNIVERSITAT, MARBURG /WEST GERMANY/.
Electron-pion scattering - quantum electrodynamics
AFOSR-65-0649 N65-28923 17-24
PHILLIPS PETROLEUM CO., IDAHO FALLS, IDAHO.
Slow neutron scattering studies of liquid and solid argon
IDO-17089 N65-28213 17-22
Safety test engineering program - transient and destructive testing of beryllium and water reflected SNAPTRAN-2/10A-1 and 2/10A-3 reactors
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Post test physical, chemical, and metallurgical analysis of SNAPTRAN-3 fuel - fuel element damage during destructive testing of SNAP-10A/2 reactor
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PICATINNY ARSENAL, DOVER, N. J.
200 second settable magnetic core timer
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Axial temperature gradient in flow with surface boiling - variations in temperature of subcooled water during flow through heated pipe
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PLASMADYNE CORP., SANTA ANA, CALIF.
Hyperthermal material test facilities - space flight environmental simulation for testing materials for reentry vehicles
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POLISH ACADEMY OF SCIENCES, CRACOW.
Rapid identification of isobars by large angle scattering of low energy alpha particles from cyclotron
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Elastic scattering of alpha particles on calcium 40 nucleus in angular region
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POLISH ACADEMY OF SCIENCES, WARSAW.
Development of low energy nuclear physics - ionization cross section
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Nuclear radiochemistry laboratory for nuclide measurement - radioactive contamination in water
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Negative pion interaction in hydrogen with highest multiplicity of charged particles
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Angular and momentum distributions of fast deuterons emitted in proton - heavy nuclei interaction
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Methods of measuring inaccessible arbitrary linear microwave two-ports with forward bridge
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Kinetic investigation of fully ionized gas - Brownian motion of test body due to multiple interactions with field particles
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Titanium oxide, zirconium titanate, and barium titanate coatings on niobium-zirconium tubes and calcium titanate and iron titanate on stainless steel emittance testing
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PRATT AND WHITNEY AIRCRAFT, MIDDLETOWN, CONN.
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Power distribution determination for critical assemblies in nuclear reactors with catcher foil techniques - reactor technology
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PRESSURE TECHNOLOGY CORP. OF AMERICA, WOODBRIDGE, N. J.
Tensile tests, stretching, and fluid-to-fluid extrusion of metals
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Viscoelastic properties of phosphinate inorganic coordination polymers
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Stable confinement of plasma in helical system where contour integral has local maximum
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Combustion mechanism of composite solid rocket propellants based on ammonium perchlorate - high energy oxidizer
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Coordinate methods for determining scattering constants of charged particles in nuclear emulsions N65-28425 17-24
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Molecular electronic techniques applied to pulse code modulation /PCM/ telemetry
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Development of low-noise, multiple function, metal-ceramic traveling wave tube for use as amplifier
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RAND CORP., SANTA MONICA, CALIF.
Multiple scattering in inhomogeneous finite slabs - analytical and computational techniques applied to solution of photon diffusion equation
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Spurious output signal suppression from magnetrons
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RAYTHEON CO., WALTHAM, MASS.
Theory of spin-wave generation in nonuniform magnetic fields
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Excitation mechanisms in xenon and helium-xenon gas laser, xenon lifetimes, and theory of diffusion controlled glow discharge
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RENSSELAER POLYTECHNIC INST., TROY, N. Y.
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Free thermal convection near linear source of heat
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Bibliography on lasers
LR-18863 N65-28545 17-16
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Optical technology experiments for satellite - communications, acquisition, tracking, lasers, photometry, and atmospherics
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Hydraulic purification method for extracting tar substances from residual refined oil products
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Production engineering to establish capability to manufacture tantalum pellet solid electrolyte feed-through capacitor
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Radiation hazards in handling high exposure plutonium used in fabrication of fuel elements
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Effective field of view of spectrometer with external collecting lens - light image reaching grating of spectrometer
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Alpha particle, beta particle, gamma radiation, and fluorine monitoring at Paducah plant during 1964
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Electrical analog-digital computer for geological prospecting N65-28265 17-08
BALKANYI, G.
Basic principles and applications of analog modeling - computer method
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BALTAC, M.
Phytopharmaceutical substances for plant protection and application of physiochemical aspects in conditioning process
FTD-TT-64-1121/1+2+3+4 N65-28531 17-04
BARBARO-GALTIERI, A.
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Negative pion interaction in hydrogen with highest multiplicity of charged particles
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Composition of centers of sensitivity of nuclear emulsion - gold and triethanolamine
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Hydrous titanium oxide tests in water of various temperatures
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BARR, R. Q.
Lowering transition temperature of arc-cast molybdenum to improve purity and ductility
AD-615644 N65-28232 17-15

BARTENEV, B. D.
Automated laboratory apparatus for study of animal conditioned reflex
JPRS-30962 N65-28133 17-04

BARTHOLOMEW, G. A.
Intense Neutron Generator /ING/ - spallation as basis for neutron generation N65-28577 17-24

BARTKE, J.
Negative pion interaction in hydrogen with highest multiplicity of charged particles
REPT.-597/VI/PH N65-28486 17-24

BARTLETT, E. S.
Recent developments in niobium, tantalum, and molybdenum alloy technology N65-28901 17-17

BARTUSH, T. A.
Intersections of initial and subsequent yield surfaces with hydrostatic principal stress plane - triaxial stress experiment
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Radiation effect on System for Nuclear Auxiliary Power /SNAP/ program electrical equipment
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BASHKIN, V. A.
Optimal dimension of axisymmetric body with respect to heat transfer conditions - optimal radius of circular spherically blunted nose cone N65-28076 17-33

BASINSKI, J.
Beam deflection by anomalous dispersion techniques for laser scanner application
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BASSHAM, G. D.
Models for digitally stabilized master oscillator system
RD-64-115 N65-28671 17-16

BASTELLI, M. R.
Uranium-niobium alloy - Indirect metallurgical bonding between uranium and magnox aluminum 80 by insertion of thin layer of titanium - fuel element technology
EUR-2215.E N65-28835 17-22

BASTIEN, P. L.
Data tables and graphs on particles and resonant states - mesons, leptons, pions, and baryons
UCRL-8030, PT. 1 N65-28126 17-24

BATES, C. P.
Solution to Maxwell equations for source currents in unbounded magnetoionic medium for which dielectric tensor is uniaxial
NASA-CR-63783 N65-28099 17-23

BATES, J. L.
Fission product relocation occuring during high temperature irradiation of uranium oxide fuel elements
BNWL-58 N65-28733 17-22

BATKOV, A. M.
Accuracy analysis of nonstationary nonlinear control system described by differential equations N65-27990 17-10

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Microscope and oscilloscope assembly for measuring nuclear particle trace width in emulsion layers
N65-28411 17-14

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Attitude determination system simulation with magnetometers and earth horizon sensor
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BEAL, J. W.
Trajectory of charged particle in axially symmetrical electromagnetic field including self-fields and external focusing elements
UCRL-14194 N65-28982 17-25

BEAMS, J. W.
Determination of Newton gravitational constant with improved precision
NASA-CR-63796 N65-28349 17-23

BECK, G. A.
FORAST procedure oriented language programming which permits arithmetic formulas, English word statements, and symbolic machine language for ORDVAC computer
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BECKER, R. A.
Testing of television optical system of Mariner IV under simulated launch and space environment conditions
NASA-CR-63918 N65-29137 17-14

BEDA, P. I.
Design of electromagnetic flaw detector
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BEHEIM, M. A.
Supersonic wind tunnel test of twin-duct variable geometry side inlets
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BEHROOZITOOSI, F.
Diamond and polystyrene loaded nuclear emulsion with stopping power for kaons
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BEINE, H.
High voltage source for neutron generator
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BELKIN, B. G.
Acoustic process simulation in enclosed spaces based on transposition of sound signals
FTD-TT-64-1294/1+2 N65-28971 17-23

BELL, W. E.
Chemical phenomena associated with formation of fallout particles and distribution of fission-product elements in fallout
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BELLMAN, R.
Anisotropic scattering in clouds - Determination of cloud structure and dynamics
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BELLMAN, R. E.
Mutiple scattering in inhomogeneous finite slabs - analytical and computational techniques applied to solution of photon diffusion equation
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Radiative transfer in finite inhomogeneous slab with anisotropic scattering - derivation of differential equations suitable for numerical computation with large digital computer
RM-4595-PR N65-28186 17-23
Graphs of X and Y functions of radiative transfer of Chandrasekhar for slab thicknesses and albedos for single scattering by numerical integration of integro-differential equations
RM-4531-PR N65-28965 17-23

BELMONT, A. L.
Physical metallurgy, reactor metals, chemical metallurgy, and material engineering
BNWL-79 N65-28244 17-22

BELOVITSKY, G. E.
Apparatus for measuring particle track structure in transverse and longitudinal directions in photoemulsions N65-28416 17-14

BELT, R. W.
Evaluation of 10-kw, 400-cycle gasoline-engine-driven generator set for radio terminal of Pershing missile system
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BELYANTSEV, A. M.
Coaxial and artificial line with ferrites - engineering calculations N65-28556 17-10

BENACH, R.
Plasma physics - creation and interaction of magnetofluiddynamic vortex structures
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BENECKE, T.
Man-machine problems in VTOL aircraft - technological aspects N65-28455 17-05

BERDYKULOV, KH.
Photosynthesis of Chlorella vulgaris beyer at mass cultivation to investigate light factor on synthesis and multiplication of species

N65-28102 17-04
BEREZIN, V. M.
Numerical analysis of vertical distribution of atmospheric ozone N65-28178 17-20
BERKOVICH, I. B.
Registration of alpha particle formations emitted in nuclear emulsions by radioactive nuclei - Time discrimination of alpha particle tracks in nuclear emulsions N65-28420 17-24
BERLIN, A. A.
Thermostability of polymer chelate compounds and salicyl derivatives of ferrocene - polymer chemistry
FTD-TT-64-1261/1+2 N65-28844 17-06
BERMAN, H.
Turbocirculator to provide pumping power for high temperature gas cooled reactor - cost estimate
GA-6559 N65-28243 17-22
BERNSTEIN, W.
Plasma instabilities and electron acceleration in transition layer of exosphere
N65-28046 17-29
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Effect of irradiation by ultrasonic waves on morphological composition and physicochemical properties of animal blood N65-28701 17-04
BERTOLINO, A. V.
Low power, low level analog-to-digital converter for space vehicle applications
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BEVAN, W.
Perception of auditory patterns as function of incidental visual stimulation
TR-21 N65-28173 17-04
BIERLEIN, T. K.
Beta-alpha and alpha-beta transformations in plutonium under applied stress
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Physical metallurgy, reactor metals, chemical metallurgy, and material engineering
BNWL-79 N65-28244 17-22
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Crystal physics, nonmetals, metals, radiation metallurgy - solid state physics
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BILWES-GIRARDIN, L.
Detecting traces of alpha particles in irradiated monocrystals and use with silver chloride crystals N65-28379 17-24
Electron microscope to observe nuclear particle traces in ionographic emulsions
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Test of epoxy-glass filament wound material in free space by microwave measurement technique to determine relationship between percentage of void content and dielectric properties
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BLACKALL, P. M.
Automatic scanning and measurement of photographs from spark chamber using IBM 7090 computer
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Photographic measurement and automatic analysis of spark chamber data N65-28008 17-08
BLACKSHEAR, W. T.
Solar system geometric parameters for use as interplanetary navigation aids
NASA-TM-D-2890 N65-28738 17-30
BLAIR, W.
Manual space navigation computer to provide backup guidance capability under abort conditions during advanced manned space missions
NASA-CR-250 N65-28778 17-21
BLAKE, K. R.
Sensitivity of isotopic X-ray fluorescent technique of elemental analysis
ORO-627 N65-29001 17-23
BLAKE, M. I.
Performance tasks producing fatigue in man and other primates and use of EEG as fatigue indicator determined from partial space cabin simulation N65-28773 17-05
BLANCHET, M. R.
Man-machine relationship - Supersonic Concorde aircraft aerodynamic characteristics and systems analysis N65-28456 17-05
BLAU, H. H., JR.
Infrared spectral properties of high altitude clouds
AD-465937 N65-28601 17-13
BLAUER, J. A.
Thermodynamic and physical properties of beryllium compounds related to fuels or additives in solid or hybrid propellants
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BLOCH, H.
Flow graphs of results obtained with off-line CERN Hough-Powell digitizer data reduction system N65-28016 17-08
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Chlorination kinetics of niobium, germanium, iron, molybdenum, silicon, tantalum, and tungsten to determine effects of heat, geometric surface area, gamma radiation, and Cl amounts
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BLUM, H.
Electrophysiological implications of model of global function using simple simultaneity - brain function studies with EEG
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Evaluation of Fourier series coefficients of clipped periodic function to determine magnitude of distortion in single sideband amplitude modulated signal
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Application of integral convergence method to solution of differential equations of hyperbolic type N65-28826 17-19
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Dependency of electrical conductance on integral dosage of gamma radiation for vitreous semiconductors
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BOBROWSKY, A.
Tensile tests, stretching, and fluid-to-fluid extrusion of metals
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Automatic camera station network for bright meteor observation
NASA-CR-63624 N65-28537 17-30
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Improving antiwear properties of lubricating oils with derivatives of 2-mercaptobenzthiazole
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Increase in photosensitivity during storage of emulsion layers capable of recording minimum ionization particles under low humidity and high temperature conditions N65-28383 17-24
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Photographic developer for nuclear emulsion irradiated with electrons - charged particle
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Blob densities measured for particle tracks in nuclear emulsions enriched with hydrogen
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Capacitance-type ferrite transducers of yttrium-garnet with high resistivity - characteristics and electric properties N65-28568 17-14
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Methane storage and acquisition by liquefication of natural gas
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Initial data for relaxation kinetic equation in uniformly expanding gas N65-28074 17-12
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Thermodynamic equilibria of glass-metal systems UCRL-11816, REV. N65-28893 17-15
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Nuclear magnetic resonance - chronological bibliography
AFOSR-65-0579 N65-28838 17-06
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Transistorized device for measuring multiple scattering and track curvature in nuclear emulsions N65-28412 17-14
BOTTORFF, P. S.
Spurious output signal suppression from magnetrons PT-882 N65-28326 17-09
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Stability of aircraft equipped with automatic pilots and mathematical analysis of linear equations to represent stabilization control elements
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Fracture mechanics - linear elasticity for strain energy rates for edge notches in tensile sheet
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Beta-alpha and alpha-beta transformations in plutonium under applied stress
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AD-615497 N65-28237 17-07
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Laser research dealing with effect of pumping on ruby quality, lanthanum fluoride examination, large ruby laser rods, dc operation of mercury tube, holograms, and laser physics
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Operation Accordion - navigational accuracies of civil jet aircraft over North Atlantic Ocean
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Thin airfoil theory to derive wing section camber lines with wing section set at different angles of attack for use near ground
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Wigner analysis of unitary representations of inhomogeneous Lorentz group
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Evaluating high temperature infrared transmitting glasses-reflective index, softening points blending, and optical properties
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Mathematical procedures and digital computer programs for converting observed topside curves into electron density profiles
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Recrystallization of magnesium, magnesium alloys, and chromium using X-ray and microscopic techniques
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Nonlinear differential equations as models of circulatory system
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Information retrieval system for IBM 1401 and 7090 computers
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Design of radiation sterilization plants for medical supplies and pharmaceuticals
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Microyielding and macroyielding of zone refined polycrystalline iron at low temperatures
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Technique for estimating scale parameter of gamma probability density function with known shape parameter using m order statistics
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Electrochemical oxidation of saturated hydrocarbons - adsorption processes occurring at hydrocarbon electrode
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Topology of Marseille-Marignane airport, France - synoptic meteorological charts N65-28519 17-20
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Heuristic determination of elastic moduli of heterogeneous composite materials
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Spherical shell bending from axisymmetric loading
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Elastic scattering of alpha particles on calcium 40 nucleus in angular region
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Wind tunnel tests - effect of wind induced loads on dynamically scaled model of large missile in launching position
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Effects of aspect ratio and canopy shape on longitudinal and lateral aerodynamic characteristics of parawings having 50 degree sweepback leading edges
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Algorithm for adding and subtracting binary number on high speed digital computer
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Effect of variation of combustion chamber length and inlet temperature on low pressure-loss sea-level afterburner
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Blob densities for pion and electron tracks for measuring ionization - nuclear emulsion grain density in extreme relativistic region
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Air-to-ground visual target recognition - program description
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Vapor phase deposition of boron on titanium by reaction between gaseous boron trichloride and titanium metal
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CAMPBELL, D. E.
Viscous-fluid gravity-gradient damper for NASA lenticular communication satellite
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CAMPBELL, J. E.
Evaluating mechanical properties of metals - Fracture testing, exposure and stress corrosion, creep testing, strain rate, and effects of vacuum on metals N65-28932 17-17
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Effects of wing dihedral and planform on stability characteristics of aircraft model - wind tunnel testing
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FORAST procedure oriented language programming which permits arithmetic formulas, English word statements, and symbolic machine language for ORDVAC computer
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Cooling curve method of measuring specific heat of plastic and composite materials at cryogenic temperatures
GDA-ERR-AN-594 N65-29013 17-23
CAMPBELL, R.
Differential equation text - discussion of surface motion trajectory and linear equation
N65-28518 17-19
CARDUS, D.
Information processing technology for clinical investigations applied to effect of bed rest and exercise on cardiovascular responses
N65-28763 17-04
CARLAT, B.
Average power, maximum power and current densities permitted with oxidized silver-magnesium dynodes, and heat dissipation of grid controlled secondary emission electron multiplier tube
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CARRACEDO, F.
Study of radioactivity of sand grains in nuclear emulsions to obtain data on concentration of monazites N65-28432 17-24
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Astronomical theodolite for providing precise astronomic latitudes and longitudes - celestial geodesy
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Method for boundary layer calculation with mass injection - sharp edged and blunt body
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Bibliography on bismuth tellurides, lead tellurides, and tin tellurides
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High energy elastic scattering, charge exchange scattering, and polarization experiments N65-28037 17-24
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Human-aided computer linguistic method for analysis of morphological data N65-28760 17-04
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Fire and explosion hazards from massive spill of nonhypergolic fuel and oxidizer of missile propulsion system - precautions AFAPL-TR-65-28 N65-28684 17-33
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Oxygen effects on corrosion of niobium by liquid potassium ORNL-3751 N65-28141 17-06
LITTLE, P. F.
Conference on plasma waves - low and high frequency waves, collisionless phenomena, and nonlinear events CLM-R-42 N65-29056 17-25
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Optimal control laws for bilinear system in distributed parameter model - analytical determination NASA-CR-63801 N65-28336 17-23
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Particle momentum in nuclear emulsions exposed to strong magnetic field N65-28419 17-24
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Particle momentum in nuclear emulsions exposed to strong magnetic field N65-28419 17-24
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Production, combustion, and liquefaction of fluorine - chemical reaction DVL-413 N65-28986 17-06
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Theory of cumulative detection probability AD-615497 N65-28237 17-07
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Sensitivity of silicon photoelectric cell to gamma rays FTD-TT-64-1165/1+2 N65-28189 17-26
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Energy characteristics of disk type capacitance generators of unipolar and bipolar type machines FTD-TT-65-291/1+2 N65-28682 17-09
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Automatic measurement of polarization characteristics limited by antenna directivity FTD-TT-64-1281/1+2 N65-28330 17-07
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Chemotron /reversible oxidation reduction electrochemical cell/ substituted for tubes and transistors in electronic circuits JPRS-31030 N65-28586 17-09
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Skin friction in vertical cylindrical shell buried in soil under static pressure loading N65-28322 17-32
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Test of pressurized water reactor core control rod to determine effect of irradiation on properties of hafnium and consequences of abnormal corrosion of zircaloy 2-hafnium weld joints WAPD-TM-457 N65-29015 17-22
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FTD-TT-64-1356/1+2 N65-29092 17-06

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Investigation on size and density of boric oxide exhaust cloud of turbojet engine operating on trimethylborate fuel
NACA-RM-E56G30 N65-28445 17-28

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Performance test data for pressure distributions over 60 deg delta wing at Mach 1.61 and 2.01
NACA-RM-L55L05 N65-28447 17-01

LORD, J. J.
Preparation of nuclear emulsion stacks for underground detection of cosmic rays
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Diamond and polystyrene loaded nuclear emulsion with stopping power for kaons
N65-28391 17-24

LORENZ, A.
Physics progress report - nuclear and atomic physics, thermodynamics, fluid mechanics, hydrodynamics, and radiation physics
UCRL-12204 N65-28715 17-23

LOSCH, K.
Viscous-fluid gravity-gradient damper for NASA lenticular communication satellite
GER-11749, REV. A N65-29009 17-30

LOWDIN, P.
Quantum chemistry, solid state physics, quantum biology, and atomic and molecular quantum theory
REPT.-67 N65-28356 17-23

LOWDIN, P. O.
Calculation of long-range interaction of two hydrogen atoms expressed in terms of natural spin-orbitals - molecular physics
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LOWET, L.
Ions produced in chemically reacting systems by gaseous conductimetry and ionization reaction
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Determination of Newton gravitational constant with improved precision
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Combining plastic deformation of austenitic steel with hardening
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Energy characteristics of disk type capacitance generators of unipolar and bipolar type machines
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Titanium oxide, zirconium titanate, and barium titanate coatings on niobium-zirconium tubes and calcium titanate and iron titanate on stainless steel emittance testing
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Determination of friction in slide guides, antifriction properties of materials used for strap guides, and friction coefficient depending on duration of contact and sliding speed
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Dynamic polarization method of obtaining polarized protons using nuclear photoemulsions for registration of interactions
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Mathematical models of null reference and capture effect glide paths in presence of snow covered and irregular ground planes
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LUVISETTO, M. L.
Fortran diagnostic routine for GATE routine of CERN HAZE N65-28013 17-08

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Problems of gravity, weightlessness, food, solar energy, communication, radiation, and materials in colonizing outer space and life on manned orbital space station /MOSS/
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LYAPUNOV, N. V.
Lorentz lemma and power balance equation used to calculate waveguide inhomogeneities
N65-28582 17-10

LYASHENKO, V. F.
Gyro pendulum motion equations for stability of motion
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LYON, C. K.
Preparation of nitrous acid and formation and decomposition rates of nitrosylruthenium nitro complexes in nitric acid solutions
AERE-R-4769 N65-28905 17-06

LYSHEVSKIY, A. N.
Instability and criteria for decomposition of viscous fuel film in air based on waves on separation surface
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M

MAAG, W. L.
Heat transfer and friction pressure drop for forced convection of hydrogen and nitrogen through electrically heated tungsten wire mesh
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N65-28790 # 17-22 ..... GNAD-3078-28
N65-28791 # 17-14 ..... RD-65-71
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N65-28798 # 17-25 ..... PIBAL-863
N65-28799 # 17-06 ..... AD-465146
N65-28800 # 17-14 ..... RADC-TR-65-38
N65-28801 # 17-07 ..... RADC-TR-65-67, VOL. II

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N65-28807*# 17-14 ..... NASA-CR-54439
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N65-28811 # 17-06 ..... BM-RI-6649
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N65-28836 # 17-24 ..... AWRE-O-13/65
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N65-28844 # 17-06 ..... FTD-TT-64-1261/1+2
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N65-28875*# 17-28 ..... NASA-CR-54373
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N65-28884 # 17-14 ..... AWRE-O-14/65
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N65-28887 # 17-06 ..... PG-651/W/
N65-28888 # 17-06 ..... TRG-962/D/
N65-28889 # 17-06 ..... TRG-963/D/
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N65-28894 # 17-22 ..... UCRL-12180, REV. 2
N65-28895 # 17-10 ..... LAS/26
N65-28896 # 17-26 ..... PR-33
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N65-28956*# 17-32 ..... NASA-CR-266
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N65-28987 # 17-33 ..... DVL-414
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N65-28997 # 17-14 ..... T-1766
N65-28998 # 17-33 ..... ML-TDR-64-293
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N65-29013 # 17-23 ..... GDA-ERR-AN-594
N65-29014 # 17-28 ..... TPR-14
N65-29015 # 17-22 ..... WAPD-TM-457
N65-29016 # 17-17 ..... ARL/MET-55
N65-29017 # 17-22 ..... NAA-SR-9821
N65-29018 # 17-06 ..... STR-3136
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N65-29023 # 17-13 ..... K-49/65
N65-29024 # 17-09 ..... REPT.-67535-Q10
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N65-29026 # 17-22 ..... PWAC-453
N65-29027 # 17-06 ..... TID-21881
N65-29028 # 17-09 ..... AERE-R-4858
N65-29029 # 17-18 ..... DLR-FB-64-45
N65-29030 # 17-21 ..... SRDS-RD-65-3
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N65-29039 # 17-17 ..... JPRS-31225
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N65-29045 # 17-33 ..... SUDAER-232
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N65-29053 # 17-02 ..... AGARD-490
N65-29054 # 17-32 ..... NO REPORT NUMBER
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N65-29058 # 17-26 ..... TID-3583
N65-29059 # 17-07 ..... NBS-TN-304
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N65-29067 17-24 ..... CERN-65-22
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N65-29070 # 17-24 ..... ITP-155
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N65-29080 # 17-32 ..... FTD-MT-64-395
N65-29081 # 17-12 ..... FTD-MT-64-457
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N65-29103 # 17-33 ..... REPT.-446-R
N65-29104 # 17-14 ..... RC-TR-65-11
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N65-29106 # 17-13 ..... AFCRL-65-306
N65-29107 # 17-12 ..... USAAML-TR-65-20, VOL. I
N65-29108 # 17-12 ..... USAAML-TR-65-20, VOL. II
N65-29109 # 17-19 ..... AFCRL-65-321
N65-29110 # 17-07 ..... AFCRL-65-323
N65-29111 # 17-07 ..... NRL-6097
N65-29112 # 17-17 ..... AD-615789
N65-29113 # 17-23 ..... FTD-TT-64-852/1+2
N65-29114 # 17-33 ..... FTD-TT-64-1115/1+2
N65-29115 # 17-15 ..... FTD-TT-64-1140/1+2
N65-29116 # 17-08 ..... FTD-TT-64-1143/1
N65-29117 # 17-19 ..... FTD-TT-64-1144/1
N65-29118 # 17-17 ..... FTD-TT-64-1145/1
N65-29119 # 17-04 ..... FTD-TT-64-1163/1
N65-29120 # 17-26 ..... FTD-TT-64-1166/1+2
N65-29121 # 17-18 ..... FTD-TT-64-1176/1+2
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N65-29124 # 17-28 ..... FTD-TT-65-1198/1+2
N65-29125 # 17-15 ..... FTD-MT-63-191
N65-29126 # 17-28 ..... FTD-TT-64-538/1
N65-29127 # 17-17 ..... FTD-TT-64-706/1+2
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N65-29131 # 17-04 ..... FTD-TT-63-1214/1+2
N65-29132 # 17-34 ..... NO REPORT NUMBER
N65-29133 # 17-17 ..... BM-RI-6516
N65-29134 # 17-09 ..... NO REPORT NUMBER
N65-29135*# 17-03 ..... NASA-CR-63903
N65-29136*# 17-33 ..... NASA-CR-63904
N65-29137*# 17-14 ..... NASA-CR-63910
N65-29138*# 17-09 ..... NASA-CR-63914
N65-29139*# 17-07 ..... NASA-CR-63905
N65-29140*# 17-07 ..... NASA-CR-63906, APPEND. B
N65-29141*# 17-09 ..... NASA-CR-63907

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